

Paediatric Surgery

• Congenital Oesophageal Atresia
(frothy Saliva, arrested NG tube)

• Duodenal atresia:

- Commonly 2nd Part
- bile stained vomiting
- Xray → Double bubble sign

• CHPS: • in 2nd week
Projectile Vomiting
• olive like mass
• Dx → U/S
• Rx → Ramstedt's operation

Rx: Duodeno-Jejunostomy

→ Mid Gut Volvulus
(toxic pt)
Rx urgent surgery within 6 hrs.

• Intussusception:

ileocecal (commonest type)
sausage shaped mass
red current jelly stool
claw sign in barium enema
Rx hydrostatic pressure of contrast enema

• Hirschsprung Disease

- any baby & delayed pass meconium > 1 day think about it
- Anal canal & rectum are mainly affected 80%.

→ Meconium ileus

↳ Common in cystic fibrosis
• By Xray: Ground glass appearance

→ Imperforated Anus

low anomalies
♀ > ♂
High anomalies
♂ > ♀
• Dx: invetogram
• Coitest

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PAEDIATRIC SURGERY

- Oesophageal atresia
- Cong. hypertrophic pyloric stenosis (CHPS)
- Duodenal atresia
- Volvulus neonatorum (malrotation).
- Meconium ileus.
- Meconium plug syndrome.
- Hirschsprung's disease.
- Intussusception.
- Anorectal abnormalities (imperforated anus)
- Diaphragmatic hernia, exomphalos & gastroschisis
- Childhood tumours (neuroblastoma, Wilms' tumour).

DUODENAL ATRESIA

current surgery

*** Definition:** imperforation of duodenum, $\longrightarrow$ caused by failure of recanalization (may be partial or complete)

*** Pathology:** usually affect 2nd part (at ampulla of Vater)

- may accompany annular pancreas - (almost all)

- about 30% are down syndrome, 20% have CHD, 50% Low ^{birth} weight

*** C/P:** as intestinal obstruction, vomiting is bile stained.

*** invest:** Plain abd. x-ray (AXR) $\rightarrow$ distended stomach & proximal part of duodenum "Double bubble sign"

*** treatment:** Resuscitate the patient (Drip & suck) then surgery $\rightarrow$ Duodeno-Jugenosotomy or

gastro-Jugenosotomy

* duodenal atresia & stenosis have equal incidence - MCA

Bailey & Love's

Incidence of atresia in GIT: multiple sites - 15%

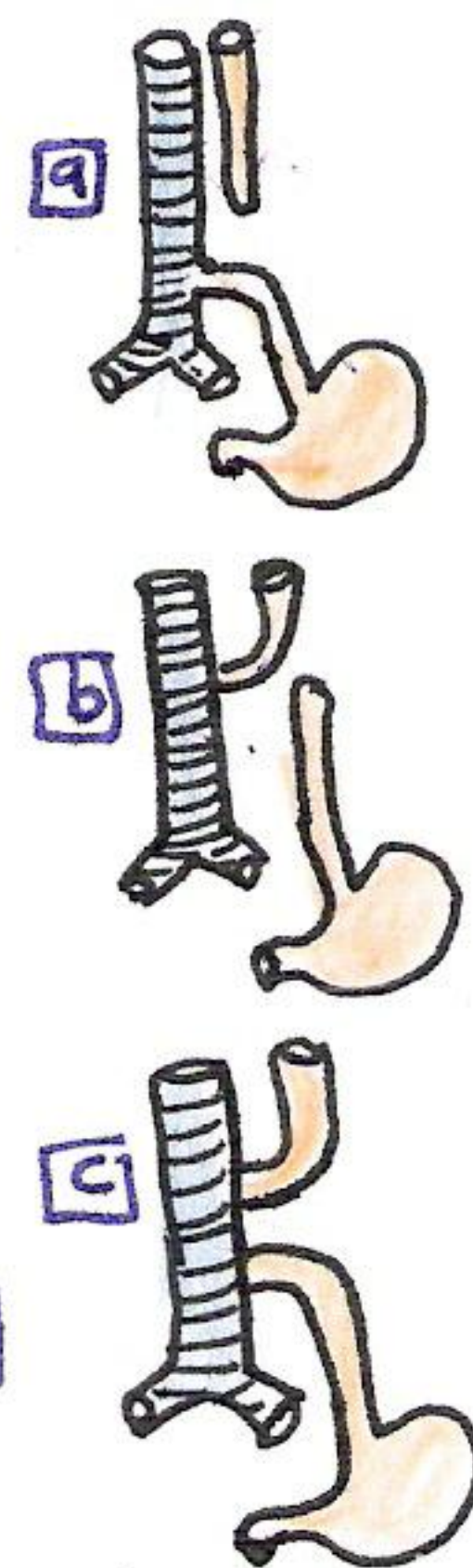
① Duodenum - 35% ② ileum - 25% ③ Jejunum - 15% ④ ascending colon - 10%

I-CONGENITA OESOPH. ATRESIA

*Incidence: 1:4000

*Types: It may be:

- ① Atresia with fistula (88%) either
 - a Proximal atresia & distal tracheoesoph. fistula. (85%)
 - b Distal " " Proximal " " " (2%)
 - c Both at same time (1%)
- ② Atresia without fistula (12%):
 - ie blinding Proximal & distal ends of esophagus.



*Clinical Picture:

- [It must be suspected in any newborn & frothy saliva]
- Antenatal Diagnosis → Mother & polyhydramnios.
- At birth: → frothy saliva, milk regurgitation, cyanotic attacks.
 - chest & pneumonia & Abdomen → Distended if atresia with fistula & scaphoid if atresia & out fistula.

*Associated congenital anomalies:-

- VACTERL syndrome (2 of them at least present).
 - Vertebral → Spina bifida.
 - Anorectal → imperforated anus.
 - Cardiac → Fallot, ASD, VSD.
 - Trachea → Tracheoesoph. fistula.
 - Renal → Polycystic kidney.
 - Limb → anomalies at radial side of limb.

*Investigation:

- ① X-ray: after injecting Lipiodol (NOT BARIUM).
- ② Fibroptic paediatric oesophagoscopy.
- ③ in examination → arrested NGT tube after about 10 cm from nose.

*Treatment:

- if & fistula → ligate fistula & 1st esoph. anastomosis [by ^{Rt} 5th intercostal incision]
- if & out fistula → ie usually long gap so do gastrostomy first then months later restore esophageal continuity.

↑ irritation of trachea & lung
↑ obstruct

G.H.P.S

"Congenital Hypertrophic Pyloric Stenosis"

* Incidence :-

- affects 1:4000 births , Male: female is (4:1) → churchill's
- Presented in 2-3rd week (never at birth)

* Aetiology :- Unknown

- Pathological there is thickening & hypertrophy of circular muscle of the pylorus.
- there is familial tendency especially on maternal side.

* Clinical Picture :-

- Affects first-born male child most commonly.
- Projectile, Non-bile stained vomiting "characteristic" and ~~and~~ infant is very hungry after vomiting
- Stool is infrequent & dry "rabbit-like stool"
- s/s of complication :-
 - dehydration, Wt loss
 - chest infection (aspiration Pneumonia).
 - Metabolic alkalosis → Tetany.
- O/E :- signs of dehydration (dry skin, sunken ^{depressed fontanelle} eye, dry tongue, oliguria)
 - test feed :- note - distension, visible peristalsis
 - palpable firm. **olive**-like mass at pylorus site
 - Succussion splash by Auscultation.

* D/D :-

- 1- Duodenal atresia
- 2- Intestinal atresia
- 3- Volvulus neonatorum
- 4- Gastroenteritis
- 5- Birth head injury

Investigations

- diagnosis is clinical.
- u/e/c , ABG (Met. alk , $\downarrow \text{Na}^+$).
- u/s $\rightarrow$ diagnostic (thick pylorus).

* Treatment *

- surgery only " Ramsted's operation (Pyloromyotomy):
this is an elective operation, done after correction of dehydration, meta. alkalosis.
- NG tube, saline lavage
- pylorus is exposed through an upper, right transverse abdominal incision. 
- Pylorus is incised longitudinally (grasped bet index & thumb)
pyloromyotomy is done until mucosa pouts (Pulges) out.

INTUSSUSCEPTION

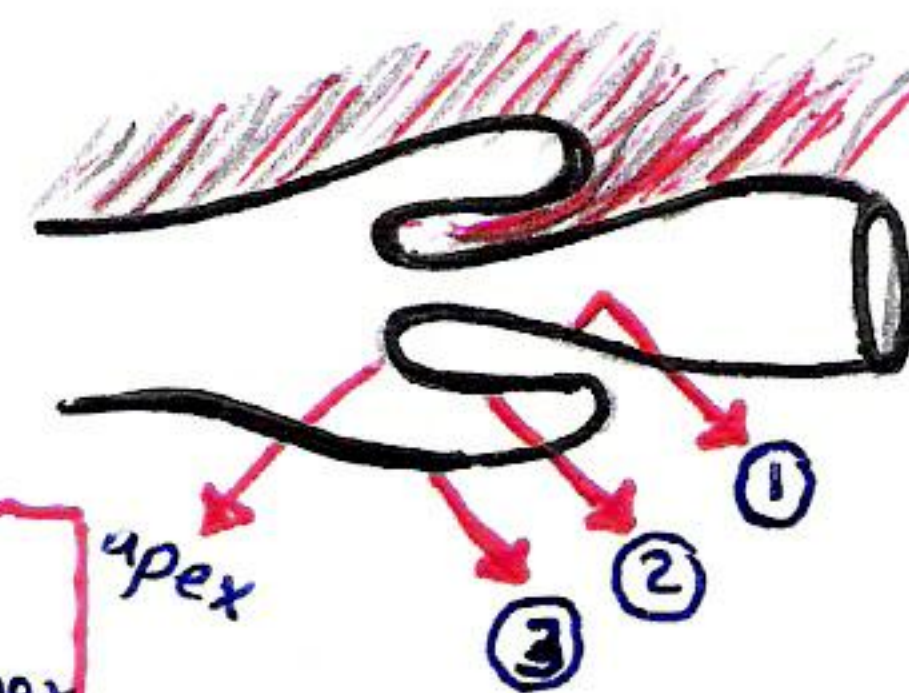
(5)

* Definition :-

- Invagination of an intestinal segment (intussusceptum) into the lumen of a distal adjacent one (intussuscepiens).
- Intussusception is composed of :-

- ① - entering inner tube (intussusceptum)
- ② - returning or middle tube.
- ③ - Sheath or outer tube (intussuscepiens).

- Mesenteric vessels may be compressed between ① & ② causing ischaemia & gangrene specially at apex



* Types (A) anatomical types :-

- ① Ileo - Caecal :- (commonest type & affect infants more).
- ② Ileo - ileal . (ileum into ileum).
- ③ Ileo - colic :- (ileo-ileal advancing till it's apex enters colon).
- ④ Colo - colic :- (colon into colon)

(B) clinical types :-

- ① Infantile type :- (common).
- ② Adult type :- (rare) :- usually due to organic lesion ^{at apex} as cancer.

* C/P of infantile type :-

- Affects ; male > female (2:1) age 2-12 months (more at 6-9 m.)
- It is most common cause of int. obst. in infant. → (current)
- Infant usually well nourished aged 2-12 m (weaning age) , c/o sever abdominal colics , screams & draws his knees up onto abdomen with interval of freedom of pain.
- with attacks pt is pallor , apathy & lethargy.
- vomiting follows attack in 85% of cases
- Mucous & blood per rectum "red currant jelly stools" → in 30% (churchill)
- O/E :: empty RIF "sign of Dance"
 - a "sausage shaped mass" may be felt. → → → → any where except RIF
 - P/R may reveal bd in 60% & apex may be felt,

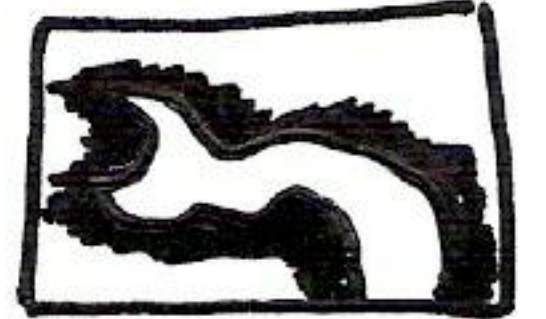


* Causes of infantile type :-

- infantile ileocaecal intussusception is idiopathic (in 95%) but may be due to → swollen lymphoid follicle which protrude into lumen acting as FB. this explain frequently at weaning & ↑ in summer due to ↑ gastroenteritis.
- Minor cases (5%) there is an evident cause (secondary) as polyp, Meckel's diverticulum, Henoch-Schönlein purpura (due to intramural haematoma).

* Investigations :-

- Barium enema - shows "Claw sign" in ileocolic or colico-colic (but not ileoileal with competent valve) ^(Baily & Love)
- Abdominal x-ray - Shows ^{typical} gas distribution
- Ultrasound, CT scan
- Blood shows ↑ WBC, hemoconcentration → (current surgery)



* Treatment :- (resuscitate with I.V fluids ± NGT ± antibiotics).

- At early stage intussusception may be reduced by the "hydrostatic pressure" of a contrast enema. (success in 60-75%) ^{churchill current}
- Surgery needed if - failed hydrostatic reduction
- perforation or peritonitis.

- At surgery do not pull on invaginated segment to avoid intestinal tear but squeeze apex of intussusception backward
- if there is gangrene do resection & anastomosis.

surgery by lower Rt paramedian transrectal incision



* Prognosis :-

- recurrence rate 1-2%, mortality is very low if ttt in 24 hr.

VOLVULUS NEONATORUM

"Midgut Malrotation"

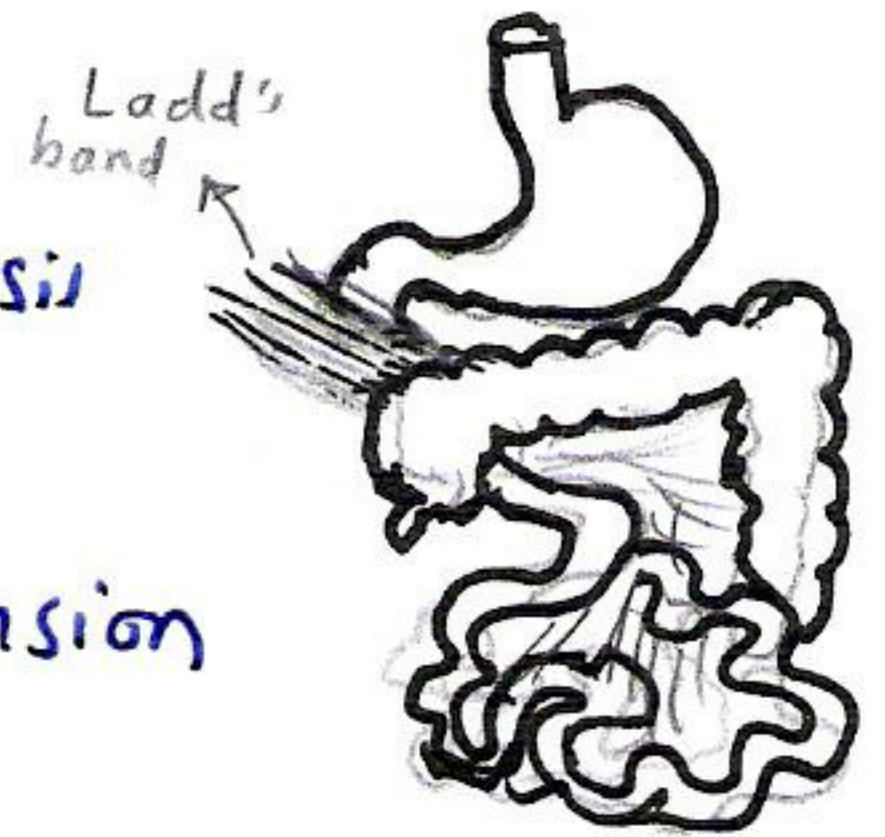
7

* Definition & causes :-

- It is a volvulus of midgut due to incomplete midgut rotation.

* Pathology :-

- Midgut having a narrow-based mesentery with a fibrous band (Ladd's band) extending from liver to caecum that can obstruct the duodenum.
- Volvulus of midgut is (clockwise) → ischemic necrosis



* C/P :-

- vomiting, bleeding P/R (infarction), mild or no distension

* Treatment:

- Urgent surgery to untwist midgut (anticlockwise), divide the band & ~~remove~~ if gangrenous do resection & anastomosis.

MECONIUM ILEUS

* Definition & cause:

- Generalized defect of mucous secretion of pancreas i.e. fibrocystic pancreas (Mucoviscidosis), usually terminal ileum obstructed by thick meconium
- (20% have cystic fibrosis), mostly is ~~followed~~ by volvulus. "current"

* C/P & Dx :-

- as intest. obst, Dx by x-ray → mottled "Ground glass appearance" meconium

* Treatment: (give oral pancreatic enzymes)

- Conservative: Gastrograffin enema → hyperosmolar (draws fluid) & soft meconium
- Surgery: Remove meconium (by enterotomy & lavage) or resect if gangrene

Meconium plug syndrome:-

2/3 are male, 30-50% born to diabetic mother

- obstruction of Lt colon by meconium plug during 1st 24 hours
- rectal examination or saline wash relieve obstruction → Pass meconium

current

HIRSCHPRUNG'S DISEASE

⑧

"Aganglionic Megacolon"

* Definition :-

- Dilatation & hypertrophy (mainly rectum) in absence of mechanical obst.

* Incidence:-

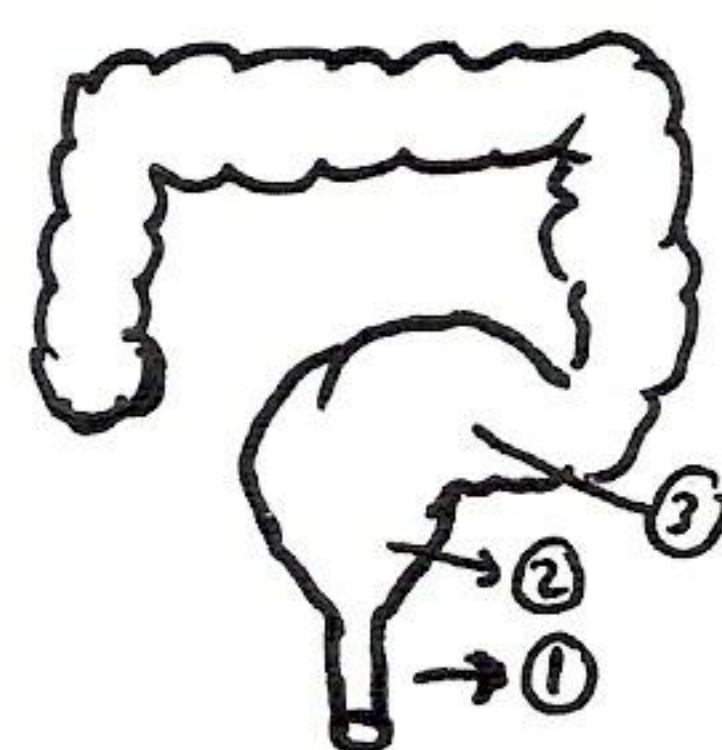
- Affects 1:5000 births, male > female (4:1), familial (6%) ^{churchill}
- One of the commonest cause of int. obst. in infancy (any newborn with delayed passage of meconium > 24hr is Hirschprung's until Proved ^{otherwise})

* Aetiology:- (unknown)

- defect in Parasymp. ganglia in the submucosal & Myenteric plexus of bowel wall (Aganglionic segment)

* Pathology:-

- Anal canal & rectum are mainly affected (80%),
- ① aganglionic segment is spastic (collapsed)
- ② conical transitional zone (1-5 cm)
- ③ dilated proximal part & hypertrophied.



* Clinical Picture:- (delayed Passage of meconium)

- Progressive constipation (motion by help of finger or tube),
- Progressive distension, recurrent enterocolitis, failure to gain wt
- O/E :- visible peristalsis, empty rectum on P/R (may follow by gush of ^{stool} gas or)

* investigations:-

- AXR (abd. x-ray) → dilated loop of bowel & fluid level.
- Barium enema → demonstrate level of obstruction.
- Rectal biopsy → shows absence of ganglionic cells.

* Treatment:-

- Preop. preparation of patient (Drip & suck regimen) → see int. obst
- resect aganglionic Part (usually 3-6 month of age) doing a colo-rectal anastomosis [usually preceded by defunctioning transverse colostomy which closed 3-4 weeks later].

ANORECTAL MALFORMATION

"Imperforated anus"

* Types :- (current)

① High anomalies :-

- Rectum ends above level of pelvic floor.
- Rectum is either a blind Pouch^{10%} or more commonly with fistula $\rightarrow$ (σ) to bladder or urethra $\rightarrow$ (ϕ) to vagina.

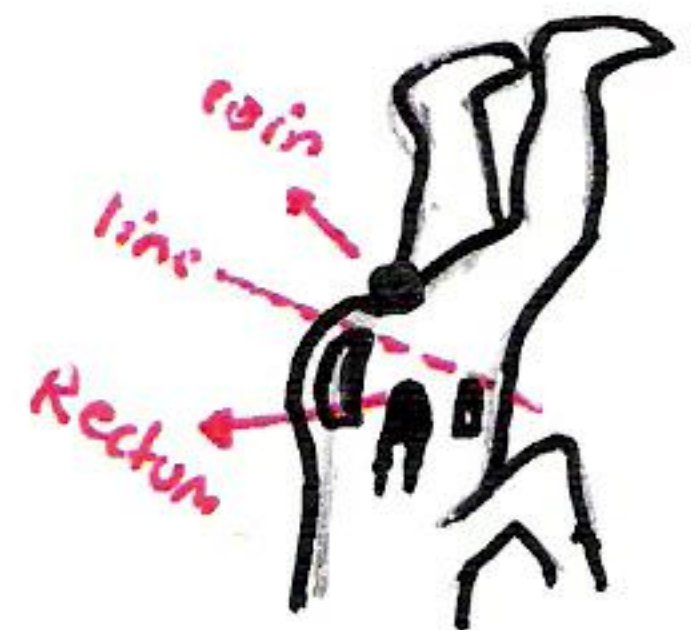


② Low anomalies :-

- Rectum has passed through pelvic floor.
- Rectum usually opens into an ectopic site (ant. to normal anus position) [or fistula to vestibule in (ϕ) or perianal skin in (σ)]

* Incidence :-

- High anomalies ($M:F = 2:1$), low ($M:F = 1:2$)
- associated anomalies are VACTERL.



* Clinical Picture :-

- examine perineum, abdomen & General examination.

* investigations :-

- Plain X-ray in inverted position (invertogram) with use of coin at anus site (Coin test) then after few minutes do X-ray $\rightarrow$ measure distance bet. coin & gas. if $< 1\text{ cm}$ $\rightarrow$ low anomaly, if $> 1\text{ cm}$ high
- Urine exam $\rightarrow$ (fistula $\rightarrow$ meconium in urine)

or draw line from symphysis pubis to coccyx if gas above it $\rightarrow$ high

* Treatment :-

- Low anomalies $\rightarrow$ local perineal surgery $\rightarrow$ (excellent result)
- high anomalies $\rightarrow$ staged surgery $\rightarrow$ (usually unsatisfactory $\rightarrow$ incontinence)
 - 1st stage : temporary colostomy.
 - 2nd stage : abdomino-ano-rectal pull through.
 - 3rd stage : closure of colostomy.

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• Hirschsprung Disease

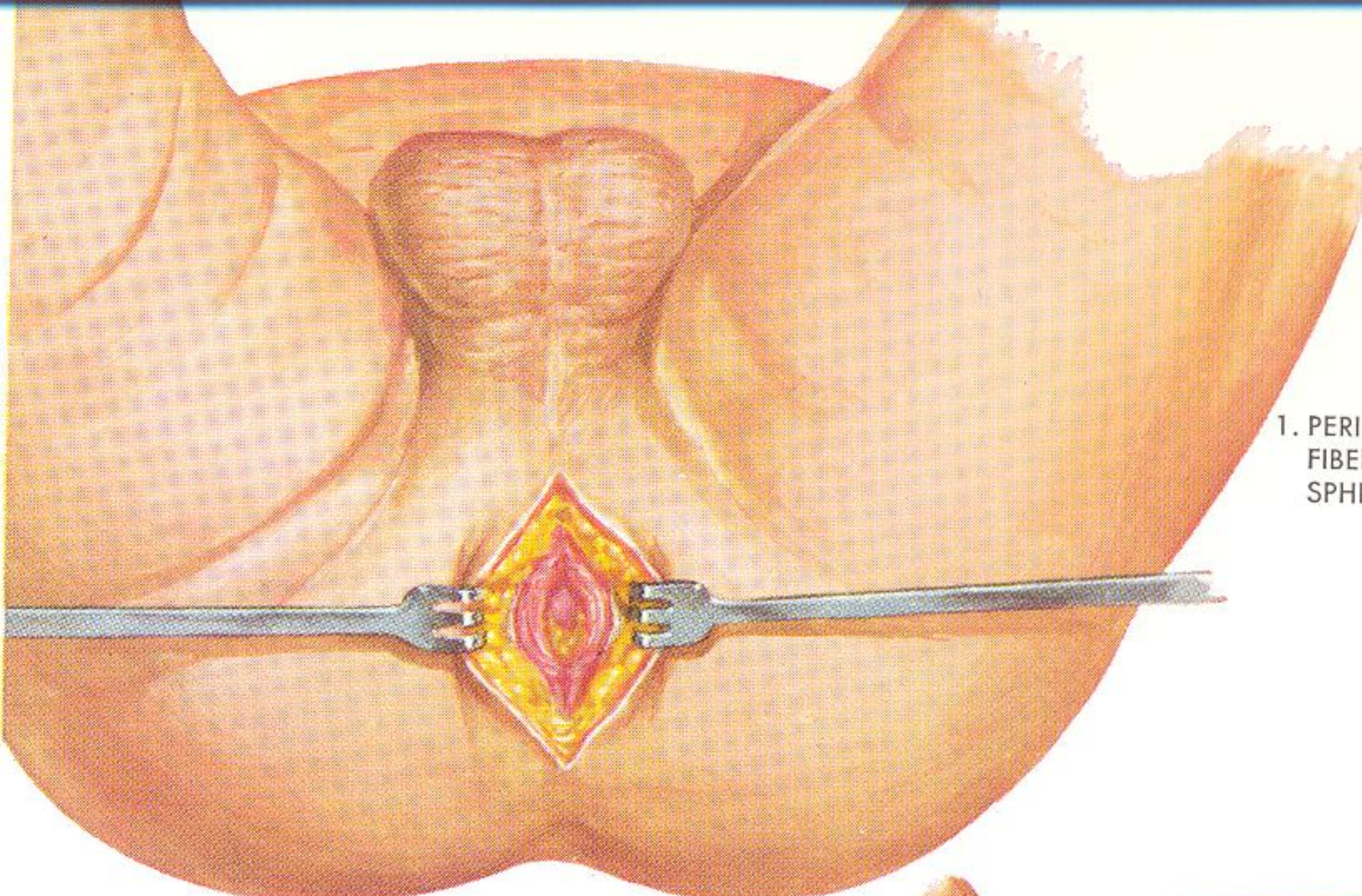
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→ Meconium ileus

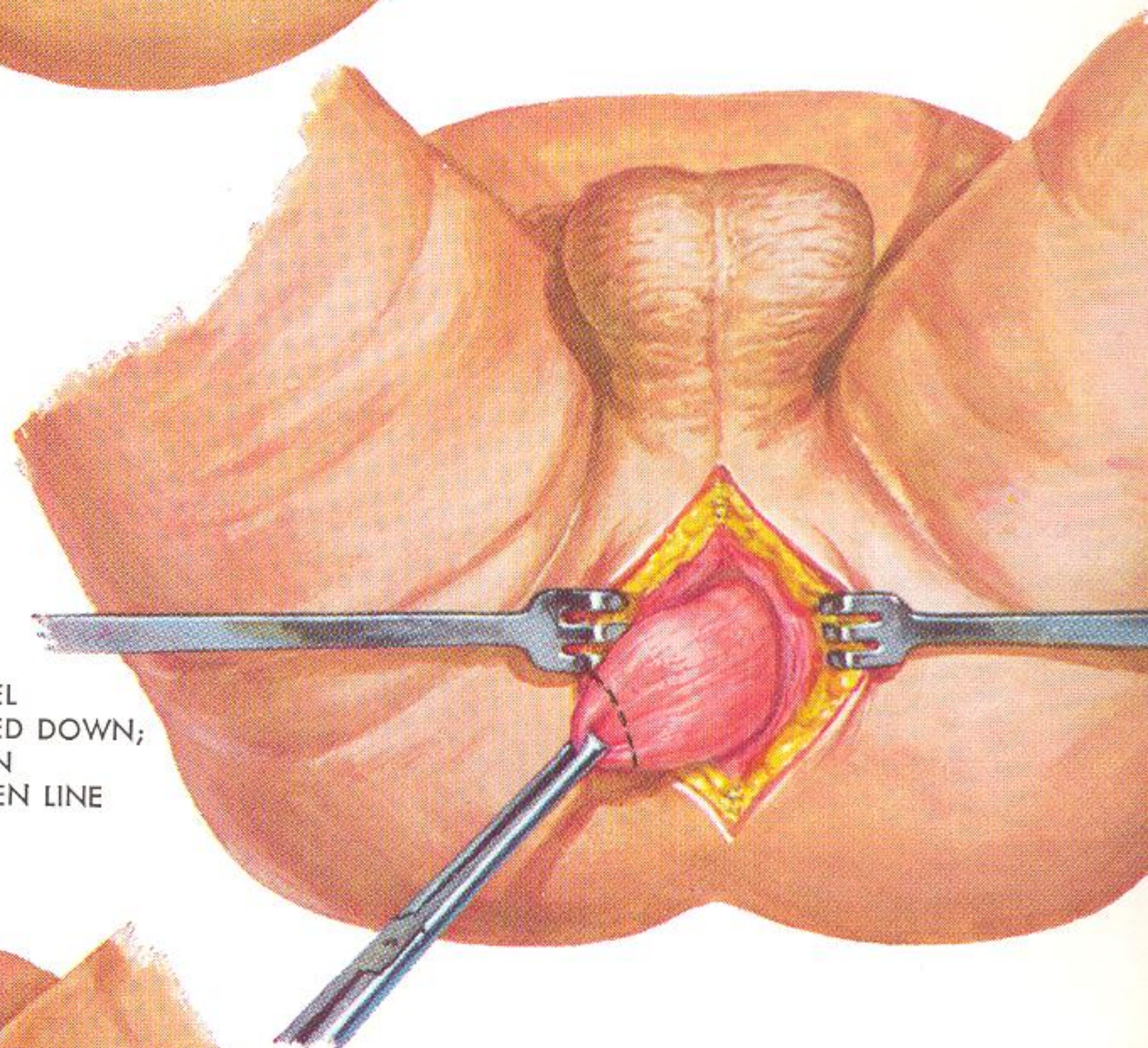
↳ Common in cystic fibrosis
• By Xray: Ground glass appearance

→ Imperforated Anus

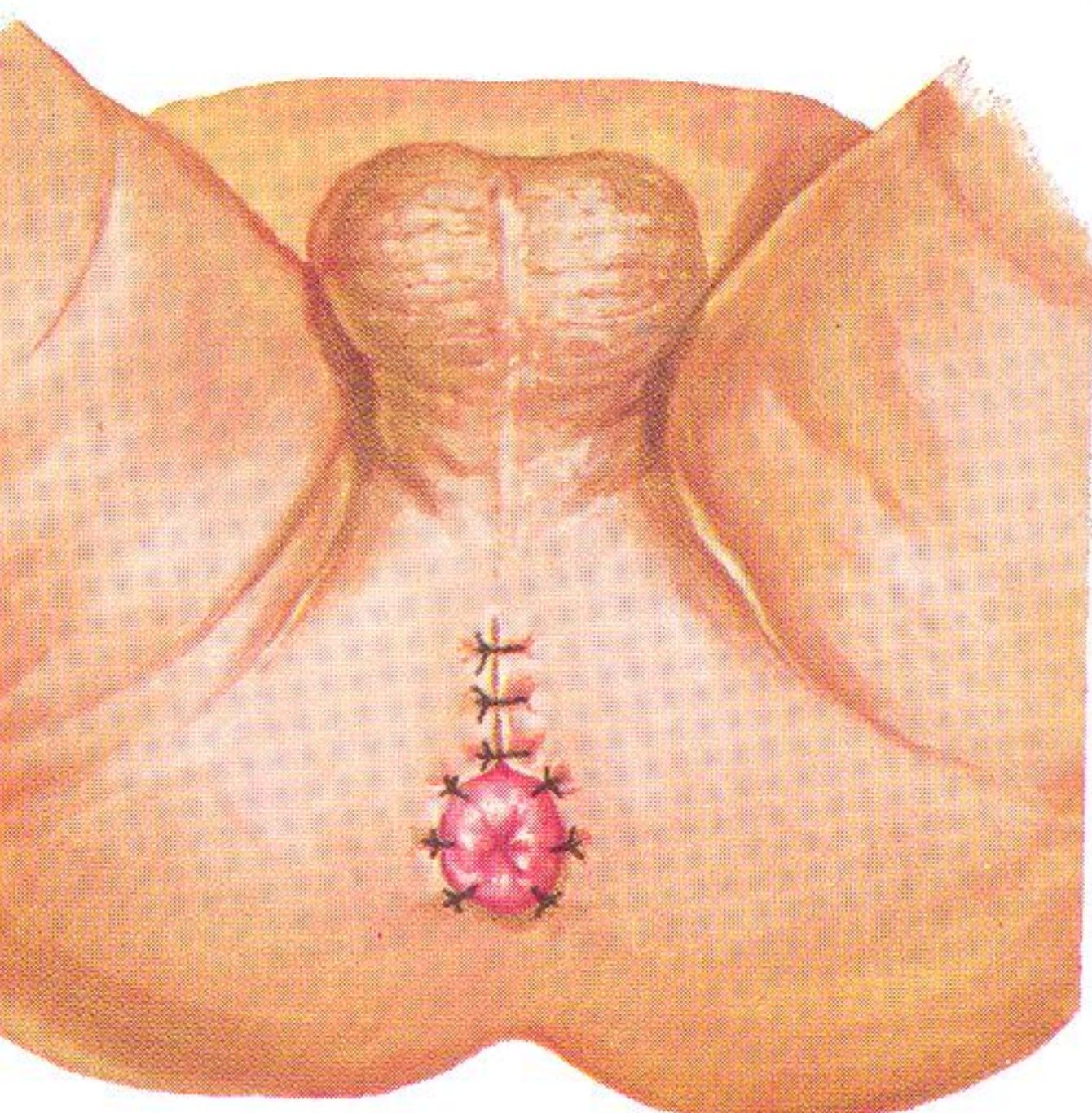
low anomalies
♀ > ♂
High anomalies
♂ > ♀
• Dx: invetogram
• Coitest



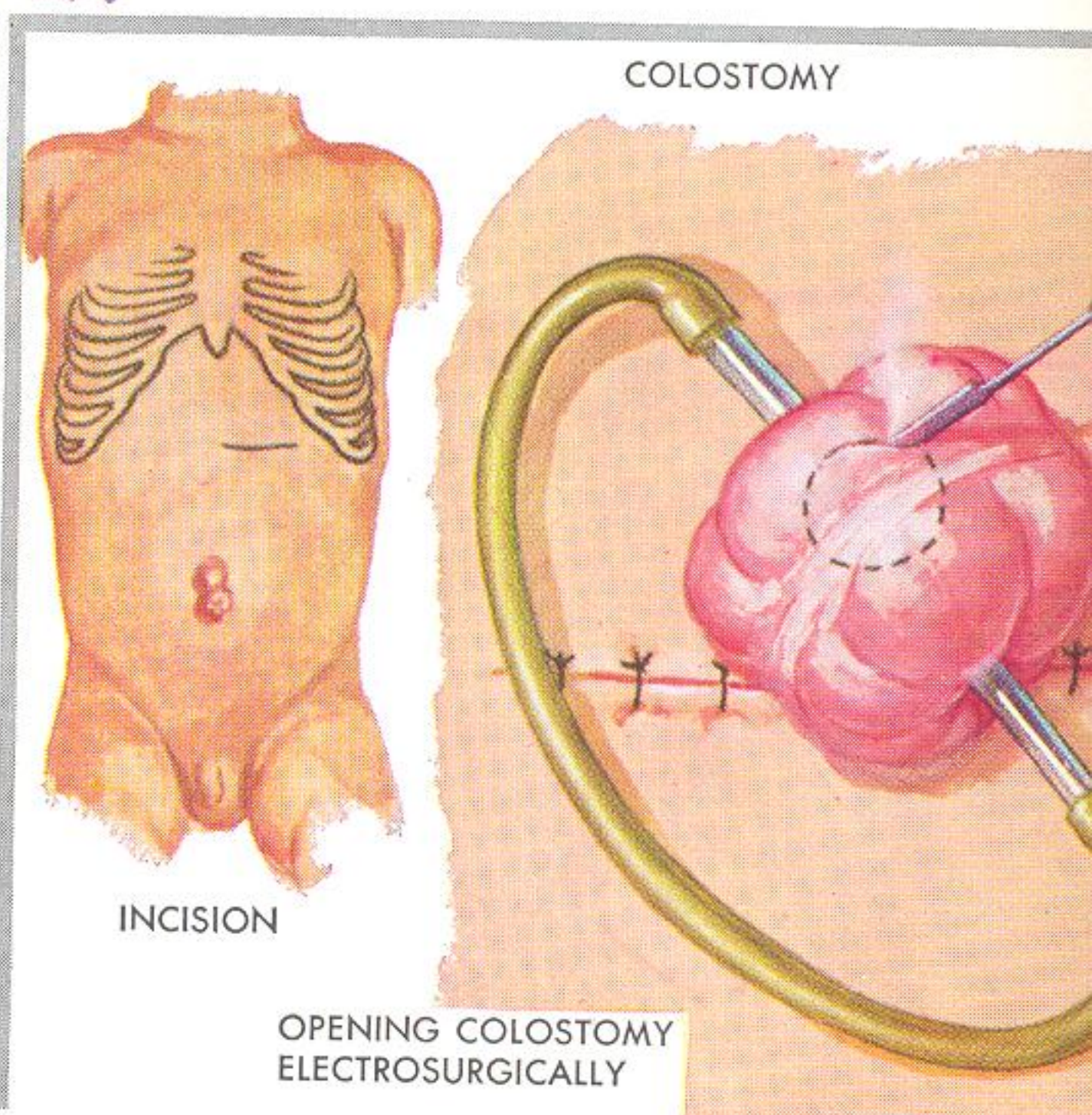
1. PERINEAL INCISION.
FIBERS OF EXTERNAL
SPHINCTER SEPARATED



2. BLIND END OF BOWEL
ISOLATED AND PULLED DOWN;
LINE OF AMPUTATION
INDICATED BY BROKEN LINE



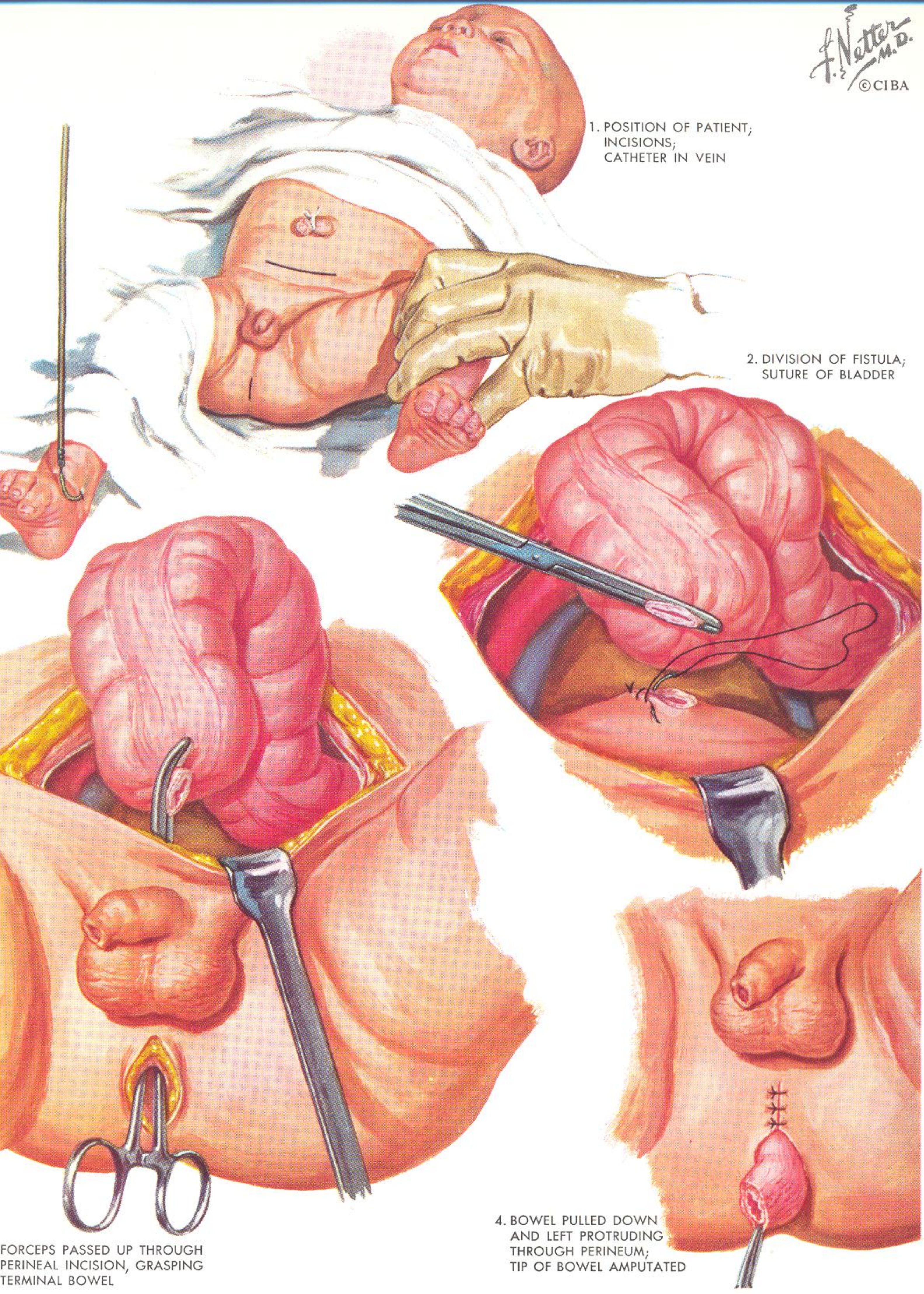
3. OPENED BOWEL END SUTURED TO PERINEUM, LEAVING
SOME REDUNDANCY; PERINEUM SUTURED



COLOSTOMY

INCISION

OPENING COLOSTOMY
ELECTRO SURGICALLY



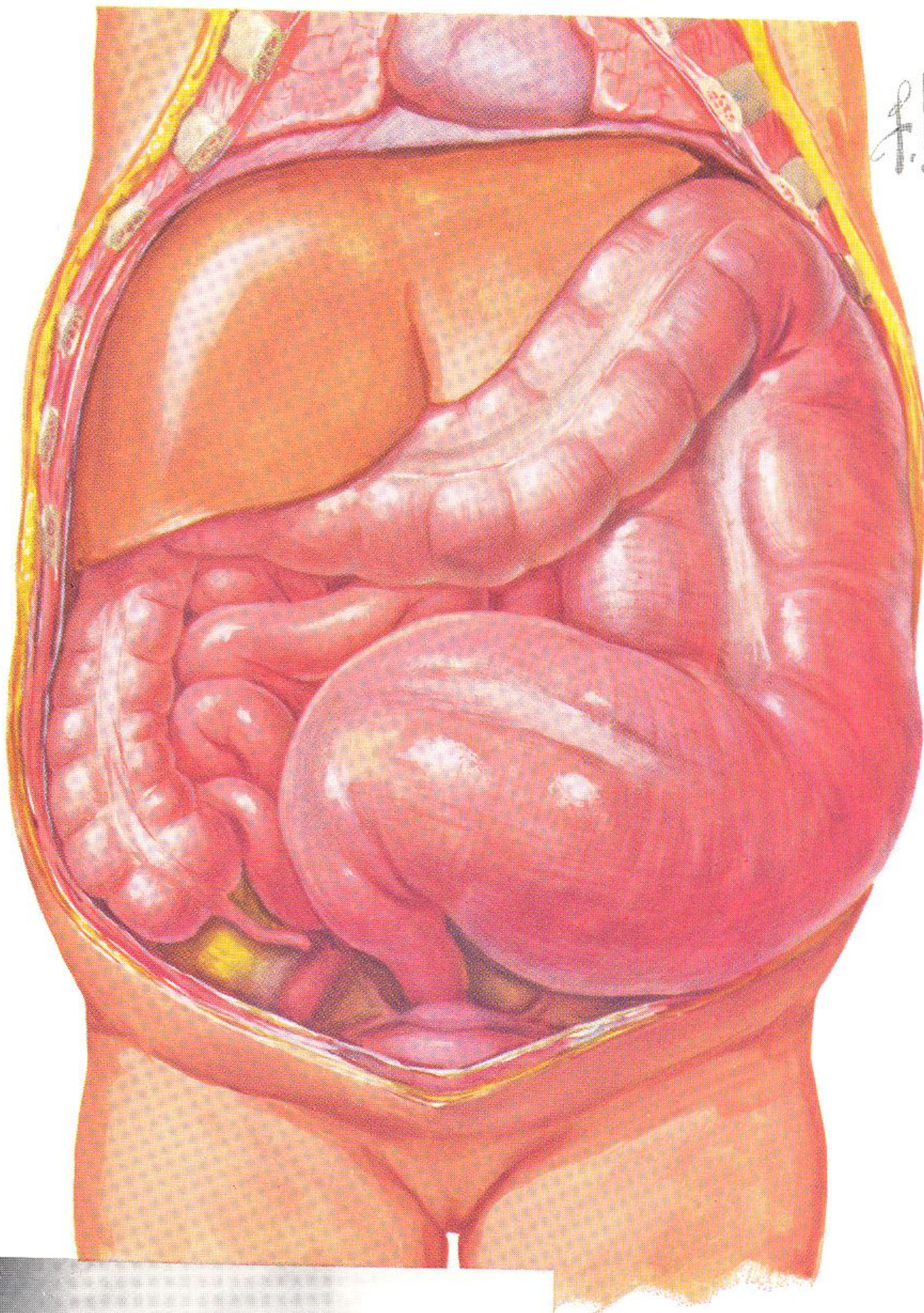
1. POSITION OF PATIENT;
INCISIONS;
CATHETER IN VEIN

2. DIVISION OF FISTULA;
SUTURE OF BLADDER

4. BOWEL PULLED DOWN
AND LEFT PROTRUDING
THROUGH PERINEUM;
TIP OF BOWEL AMPUTATED

FORCEPS PASSED UP THROUGH
PERINEAL INCISION, GRASPING
TERMINAL BOWEL

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TREMENDOUS DISTENTION
AND HYPERTROPHY OF
SIGMOID AND DESCENDING
COLON; MODERATE DISTENTION
OF TRANSVERSE COLON;
DISTAL CONSTRICTED SEGMENT



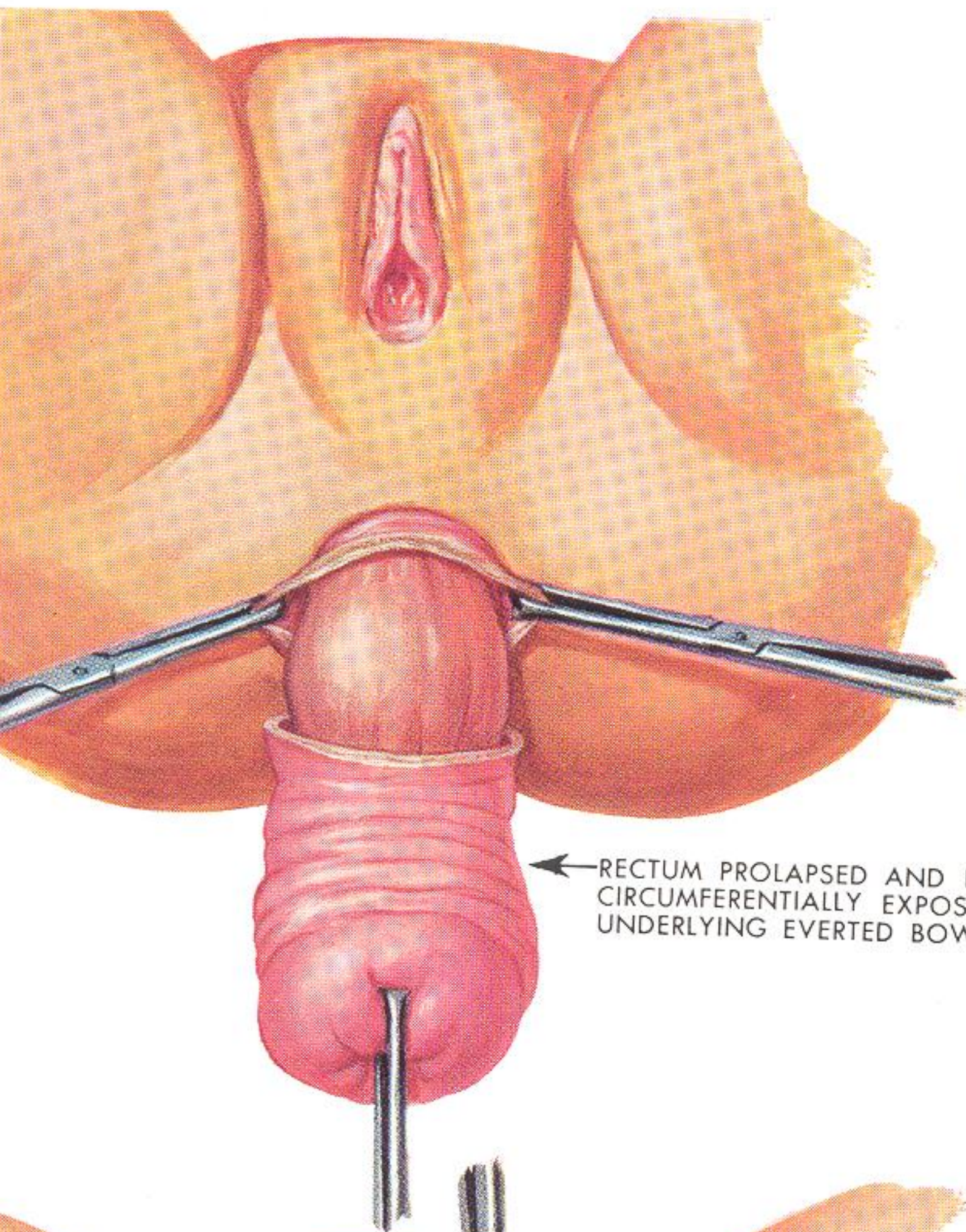
TYPICAL
ABDOMINAL
DISTENTION



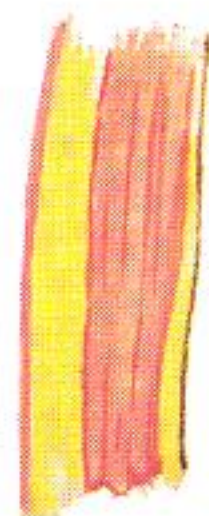
BARIUM ENEMA;
CHARACTERISTIC
DISTAL CONSTRICTED
SEGMENT

includes a statement that the child has "never had a

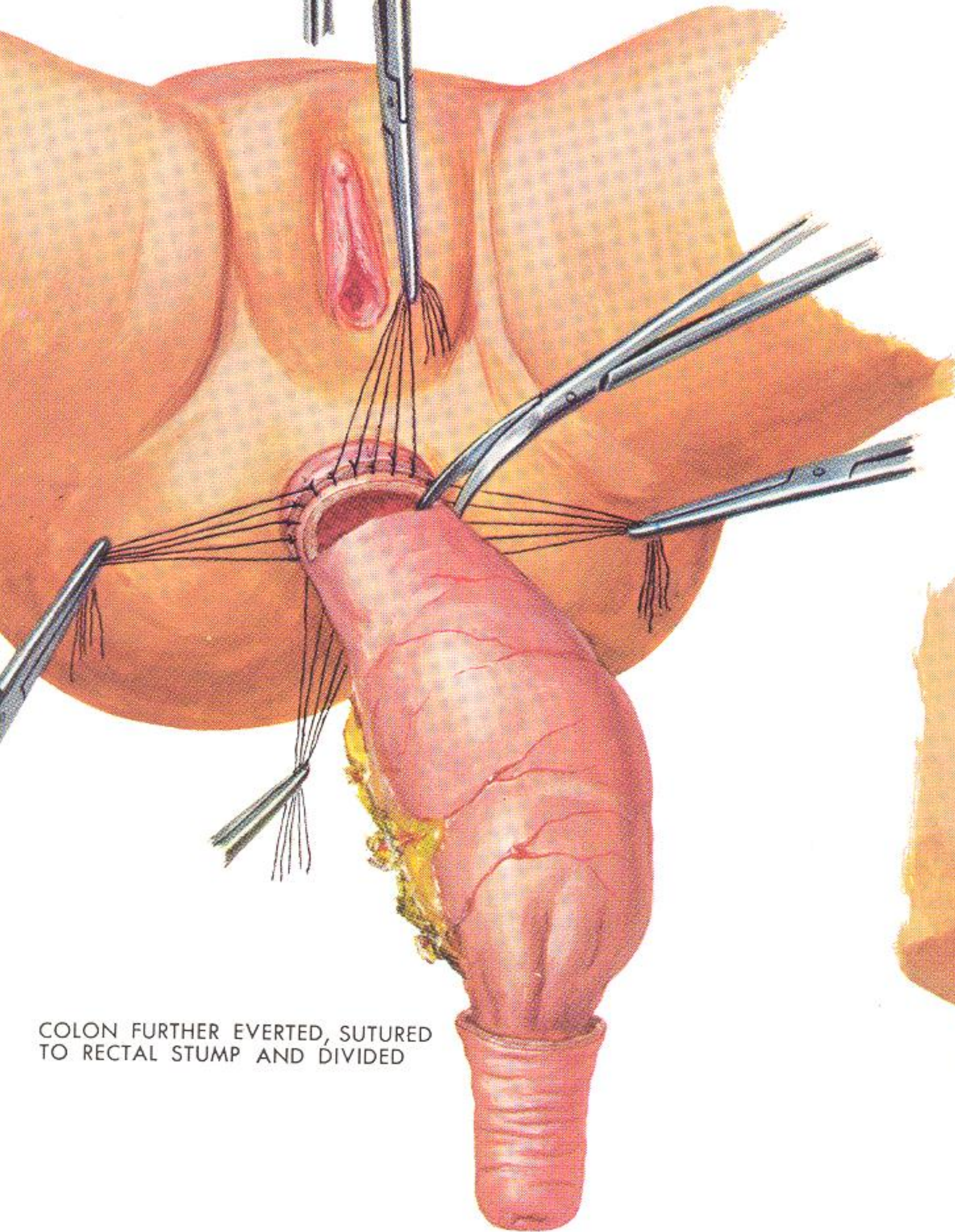
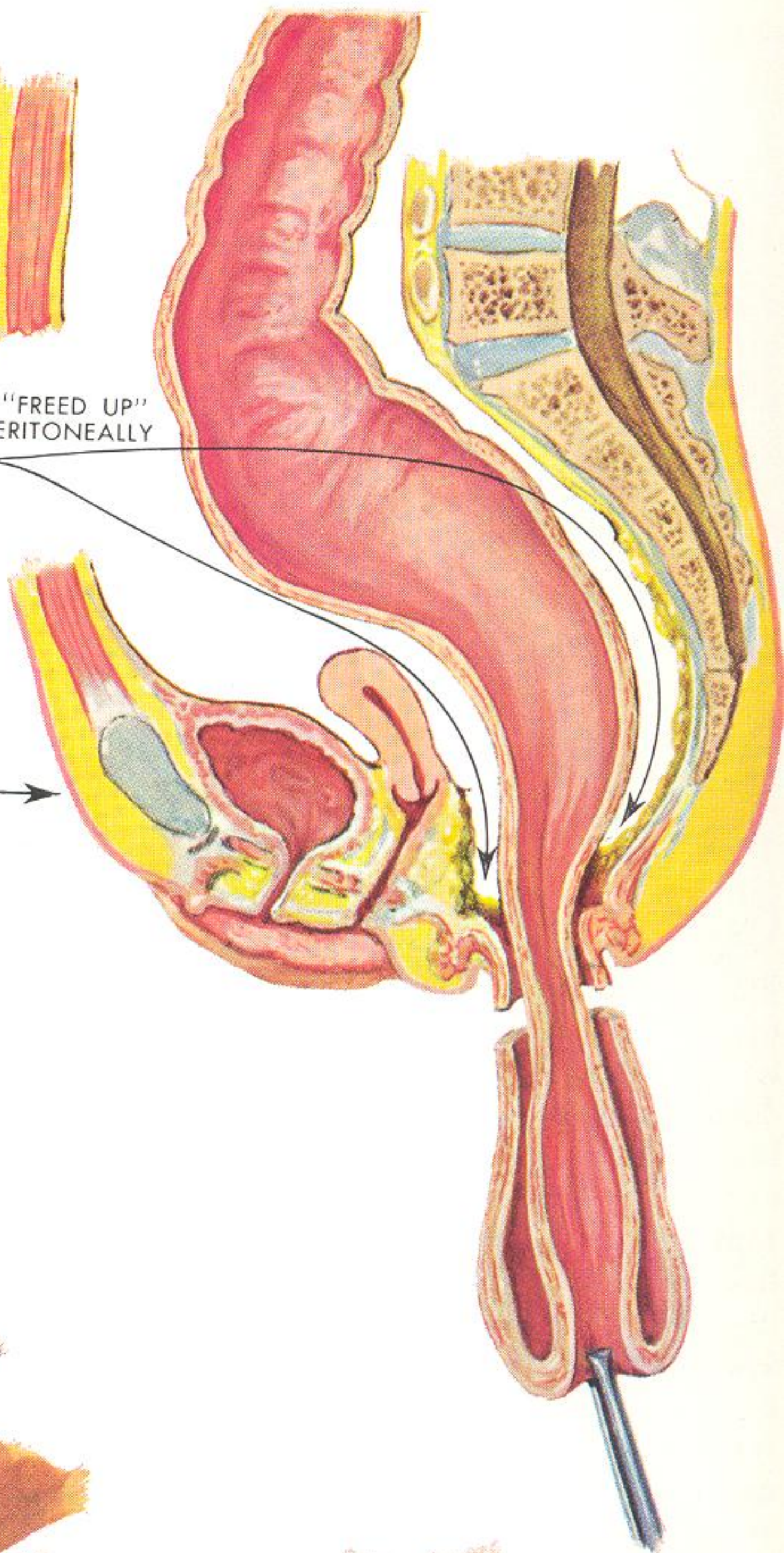
in which firm fecal masses may be felt in



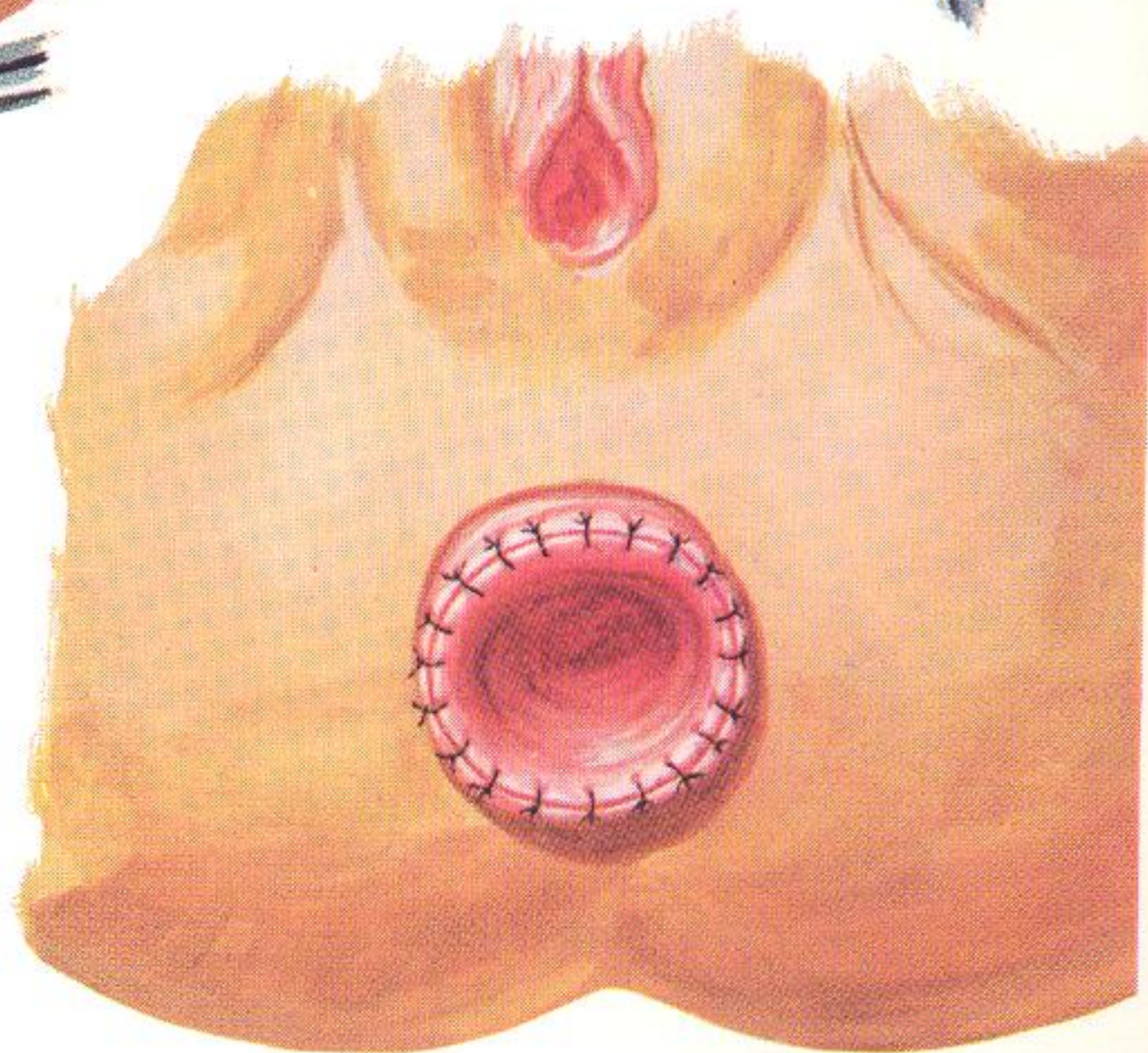
← RECTUM PROLAPSED AND DIVIDED
CIRCUMFERENTIALLY EXPOSING
UNDERLYING EVERTED BOWEL →



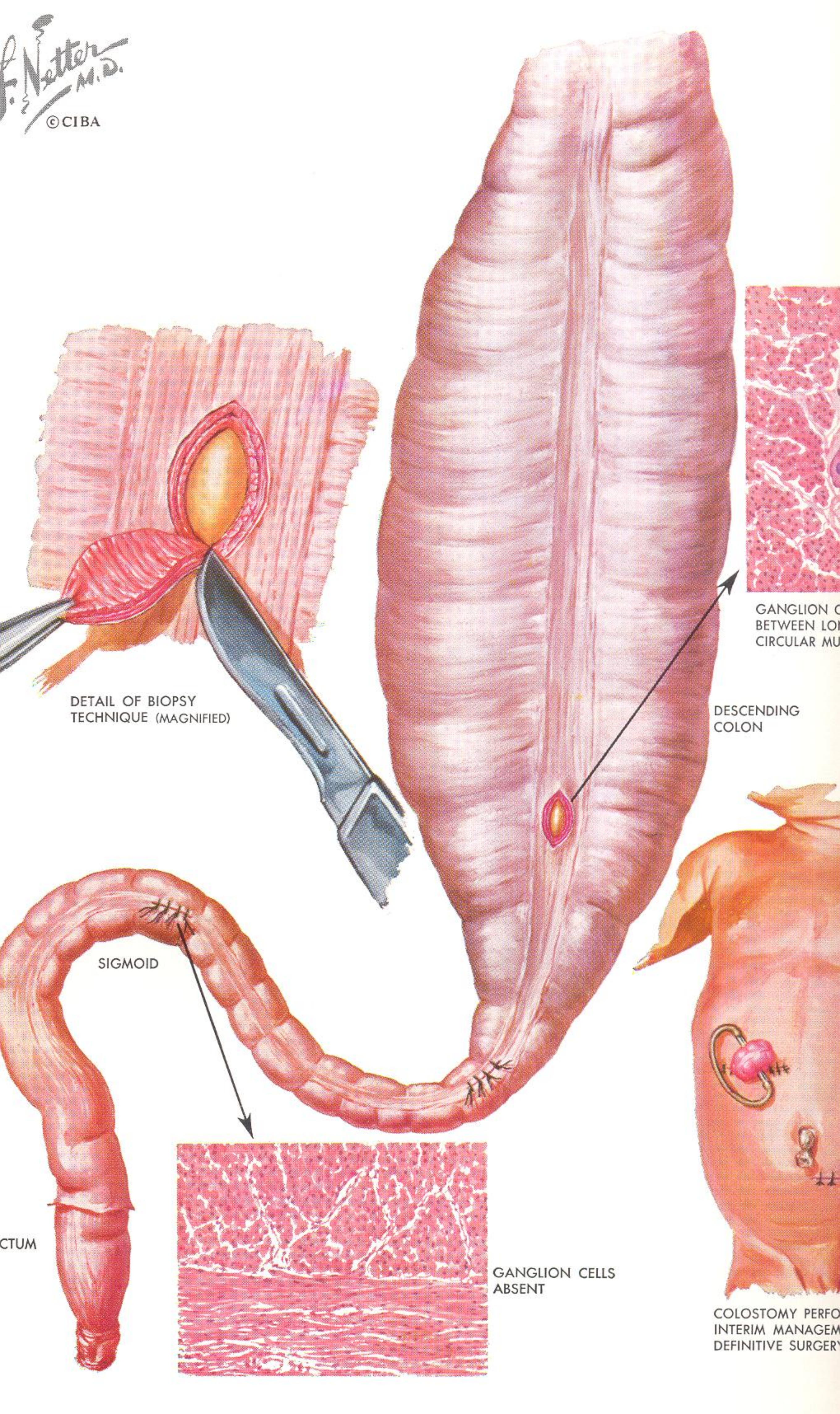
BOWEL "FREED UP"
TRANSPERITONEALLY



COLON FURTHER EVERTED, SUTURED
TO RECTAL STUMP AND DIVIDED



RECTAL AND COLONIC MUCOSA APPROXIMATED



DETAIL OF BIOPSY
TECHNIQUE (MAGNIFIED)

GANGLION C
BETWEEN LONGITUDINAL
CIRCULAR MUSCLES

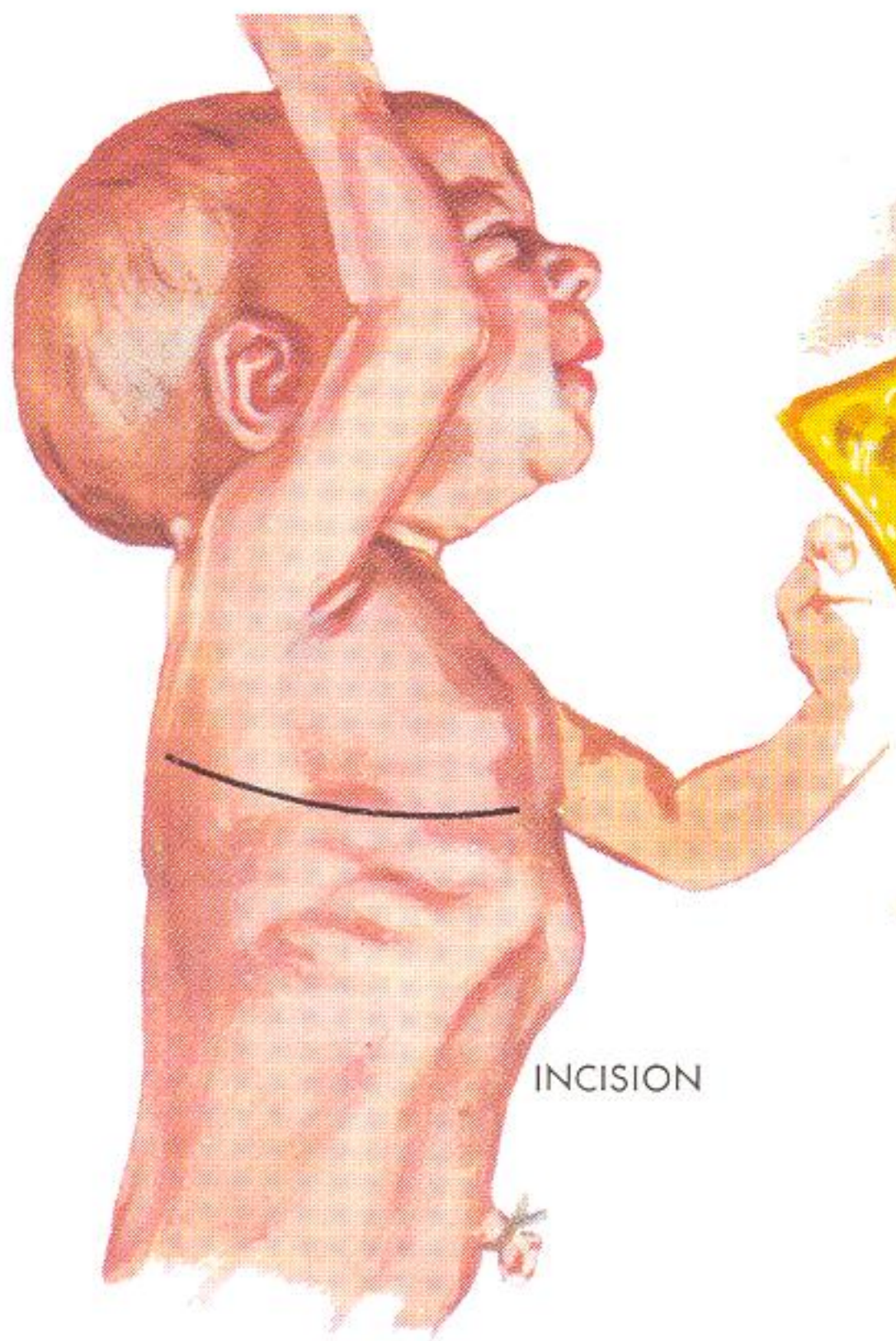
DESCENDING
COLON

SIGMOID

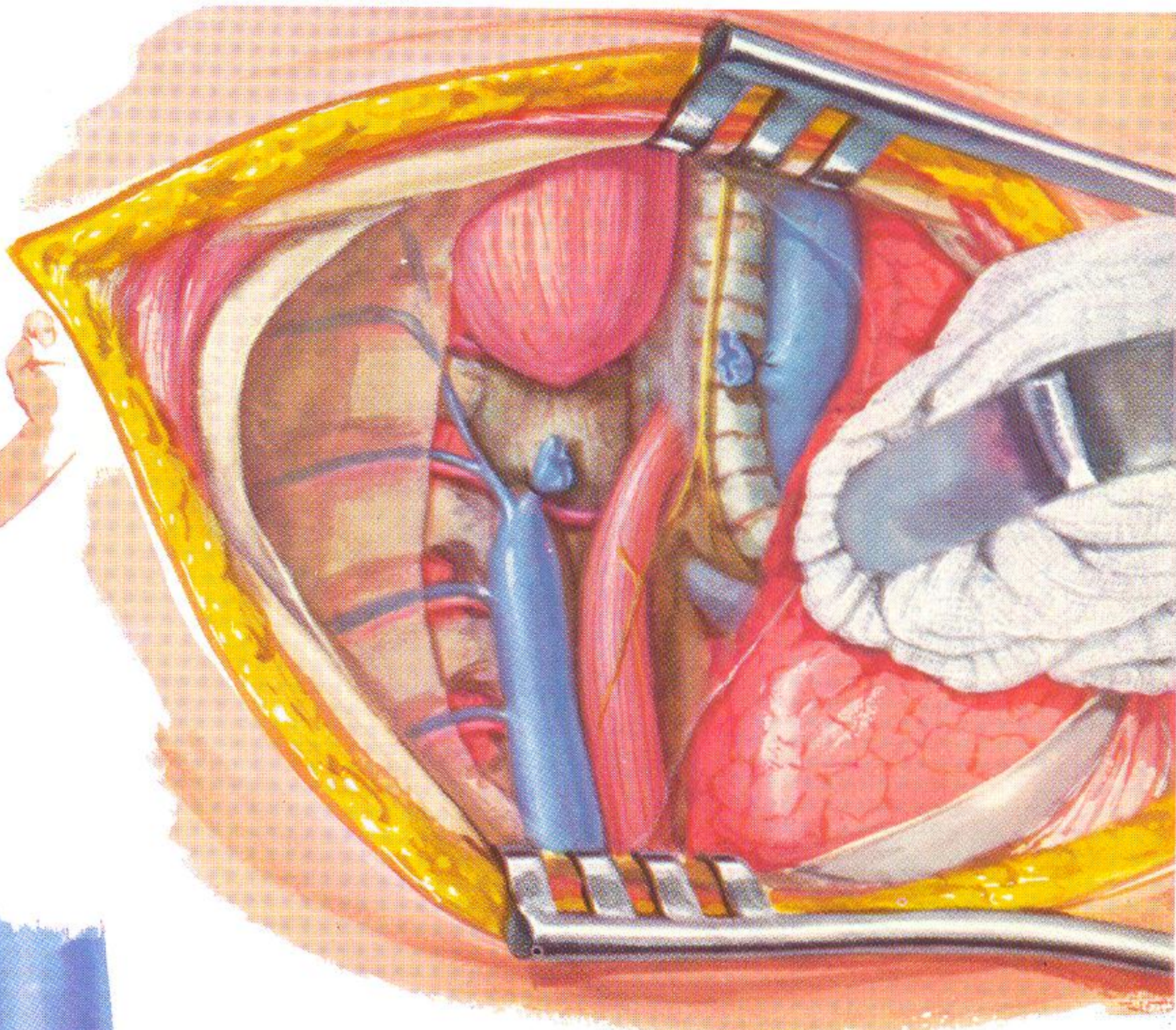
RECTUM

GANGLION CELLS
ABSENT

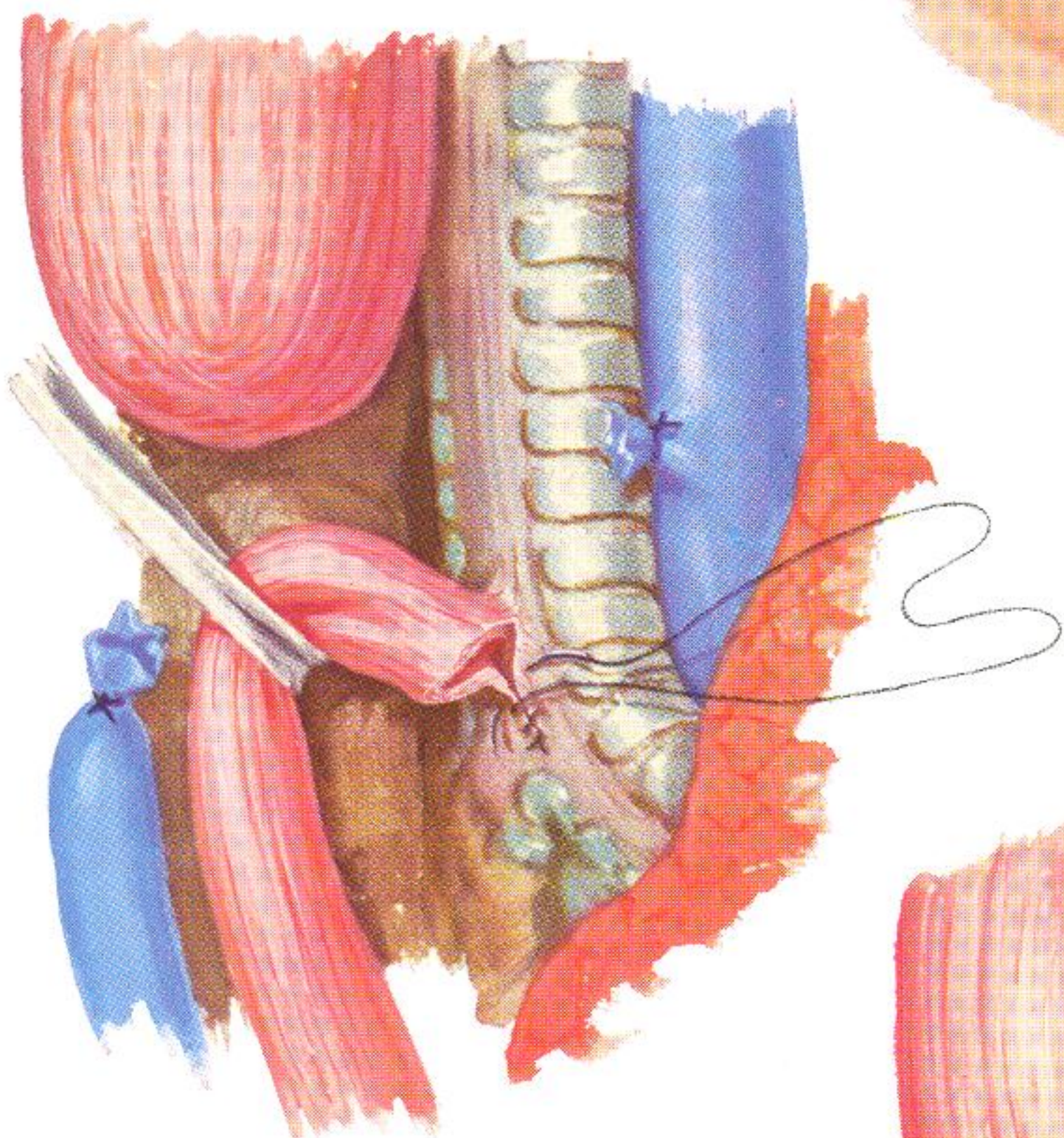
COLOSTOMY PERFORMED FOR
INTERIM MANAGEMENT
DEFINITIVE SURGERY



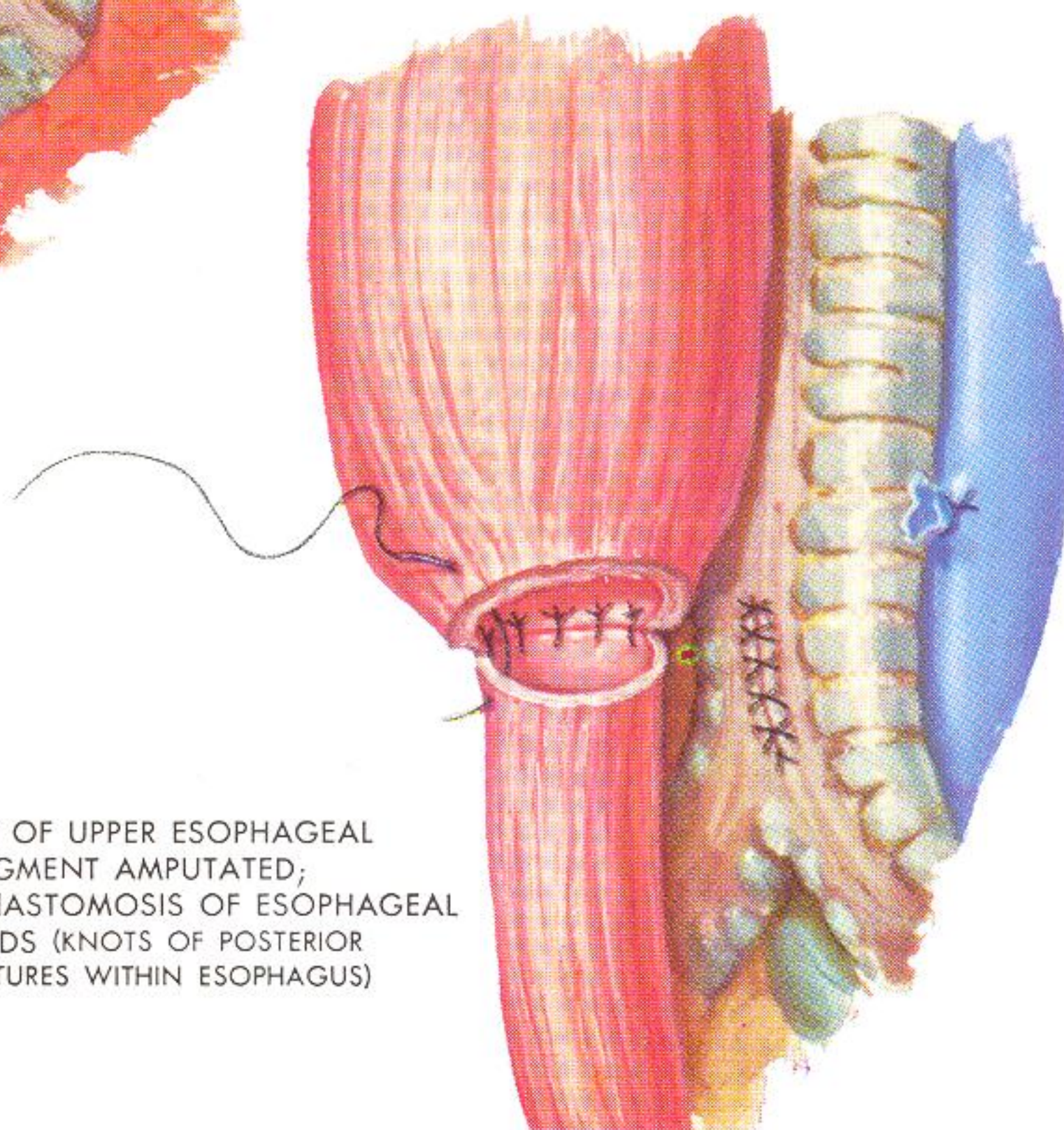
INCISION



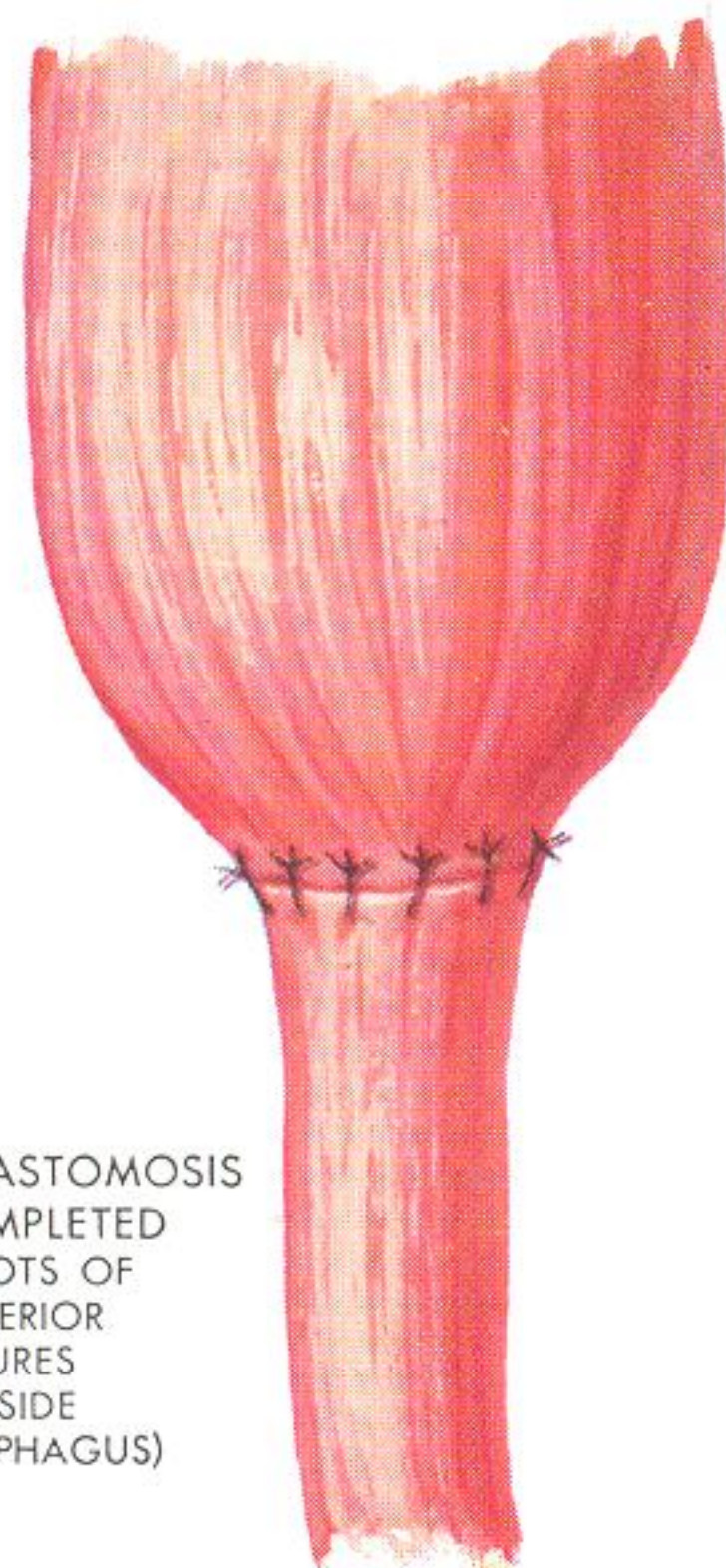
EXPOSURE: AZYGOS VEIN LIGATED AND DIVIDED;
VAGUS NERVE ALONGSIDE TRACHEA



OPENING IN TRACHEA SUTURED
AS TRACHEO-ESOPHAGEAL
FISTULA IS DIVIDED



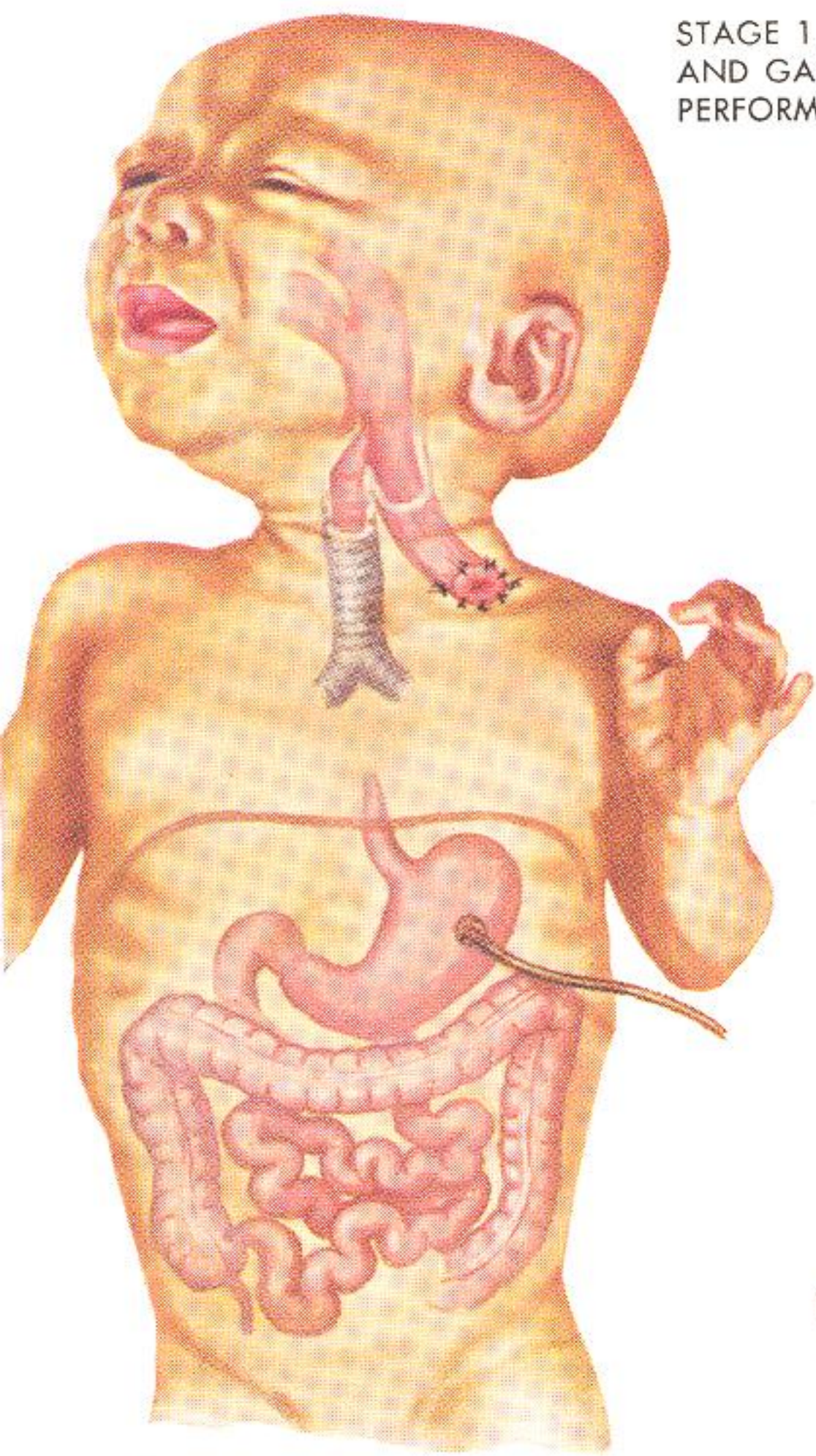
TIP OF UPPER ESOPHAGEAL
SEGMENT AMPUTATED;
ANASTOMOSIS OF ESOPHAGEAL
ENDS (KNOTS OF POSTERIOR
SUTURES WITHIN ESOPHAGUS)



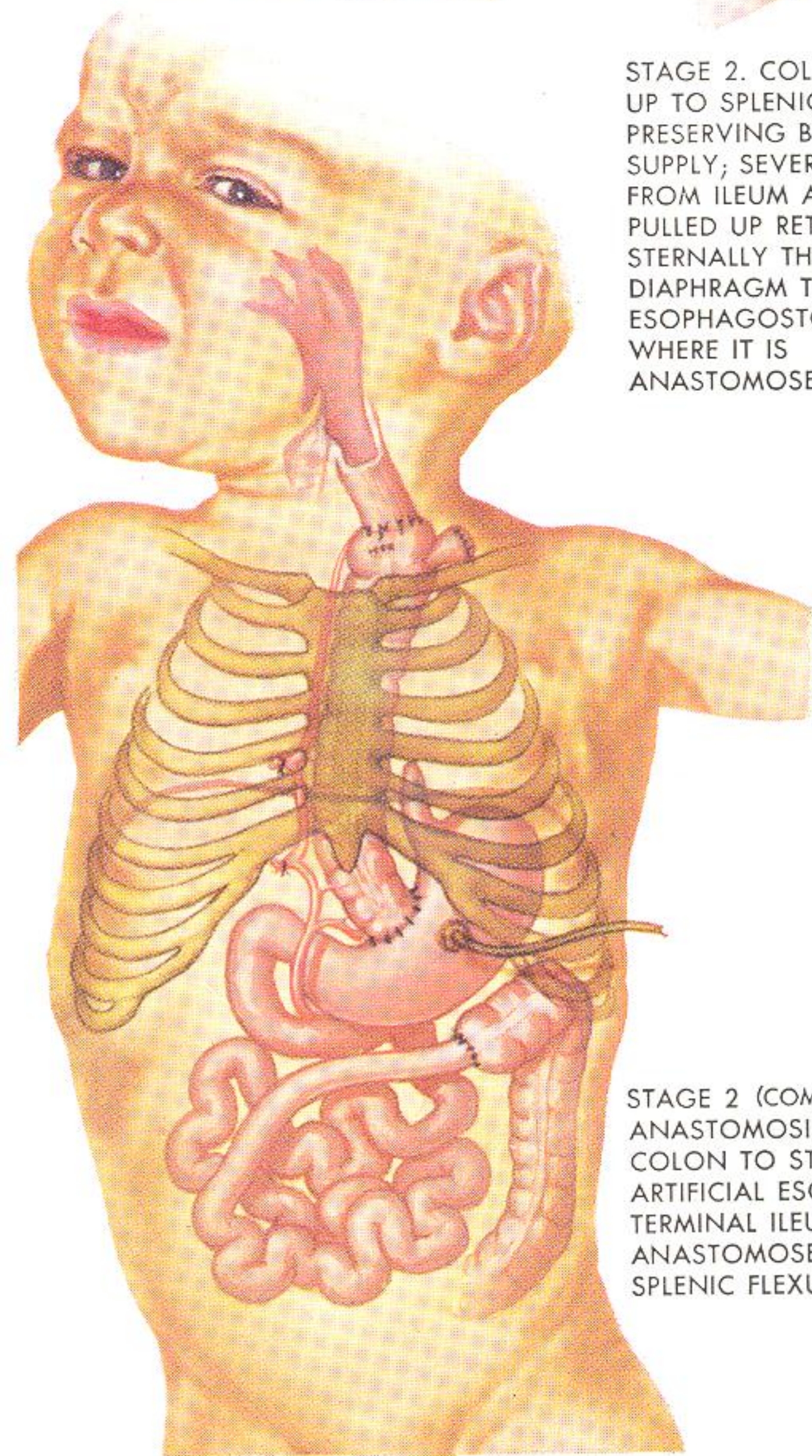
ANASTOMOSIS
COMPLETED
(KNOTS OF
ANTERIOR
SUTURES
OUTSIDE
ESOPHAGUS)

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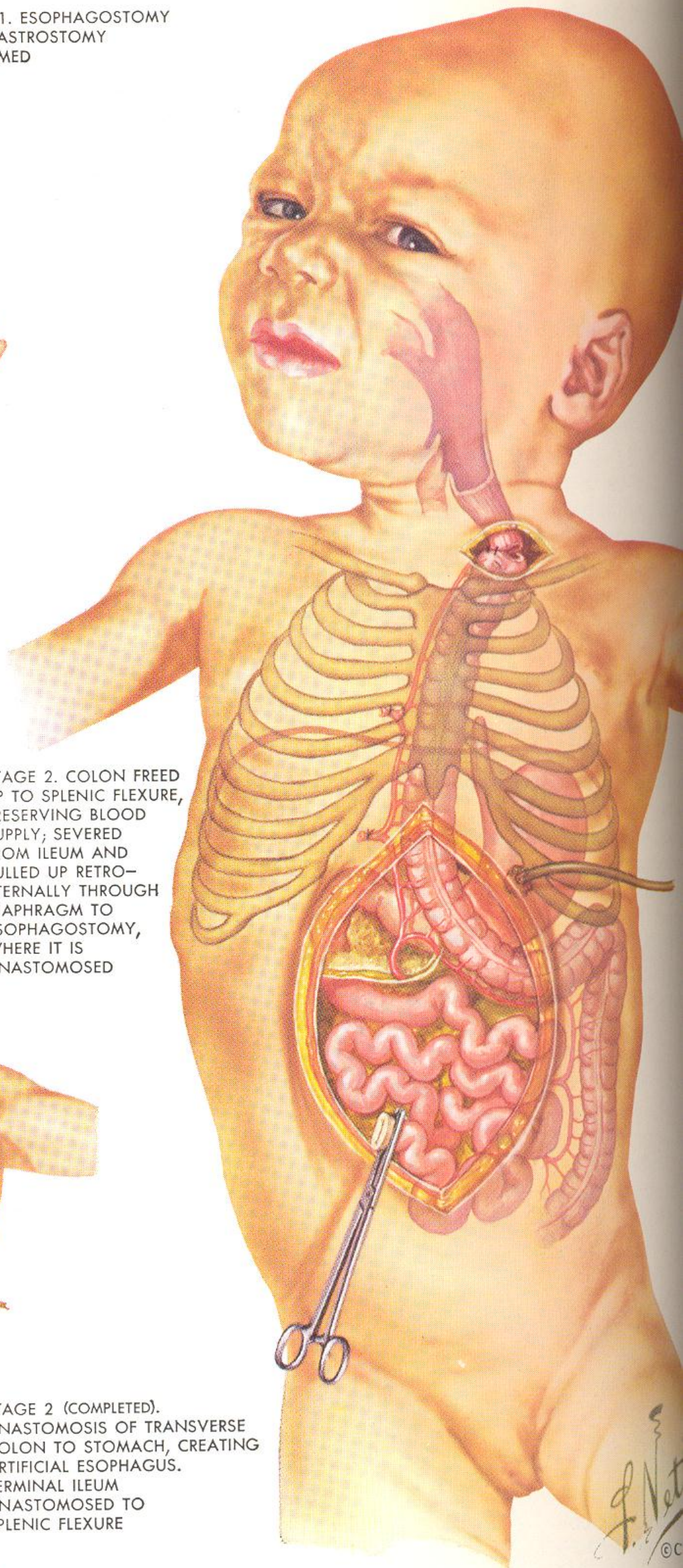
STAGE 1. ESOPHAGOSTOMY
AND GASTROSTOMY
PERFORMED



STAGE 2. COLON FREED
UP TO SPLENIC FLEXURE,
PRESERVING BLOOD
SUPPLY; SEVERED
FROM ILEUM AND
PULLED UP RETRO-
STERNALLY THROUGH
DIAPHRAGM TO
ESOPHAGOSTOMY,
WHERE IT IS
ANASTOMOSED



STAGE 2 (COMPLETED).
ANASTOMOSIS OF TRANSVERSE
COLON TO STOMACH, CREATING
ARTIFICIAL ESOPHAGUS.
TERMINAL ILEUM
ANASTOMOSED TO
SPLENIC FLEXURE



J. Net
©C

SITES OF DIAPHRAGMATIC HERNIAS

FORAMEN OF MORGAGNI

CONGENITAL ABSENCE OF LARGE AREA OF DIAPHRAGM

ESOPHAGEAL HIATUS

FORAMEN OF BOCHDALEK

RIGHT LUNG

LEFT LUNG

HEART

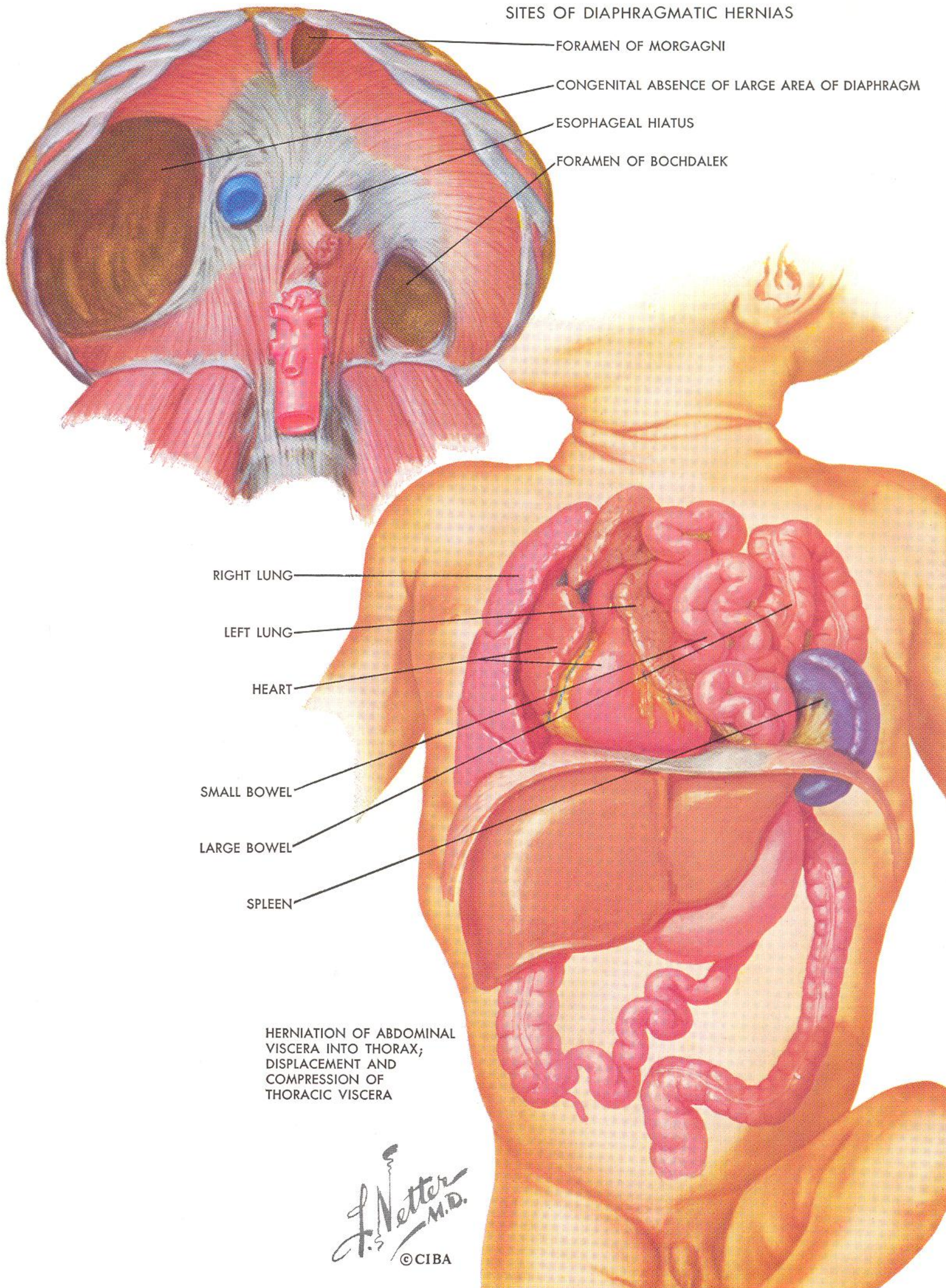
SMALL BOWEL

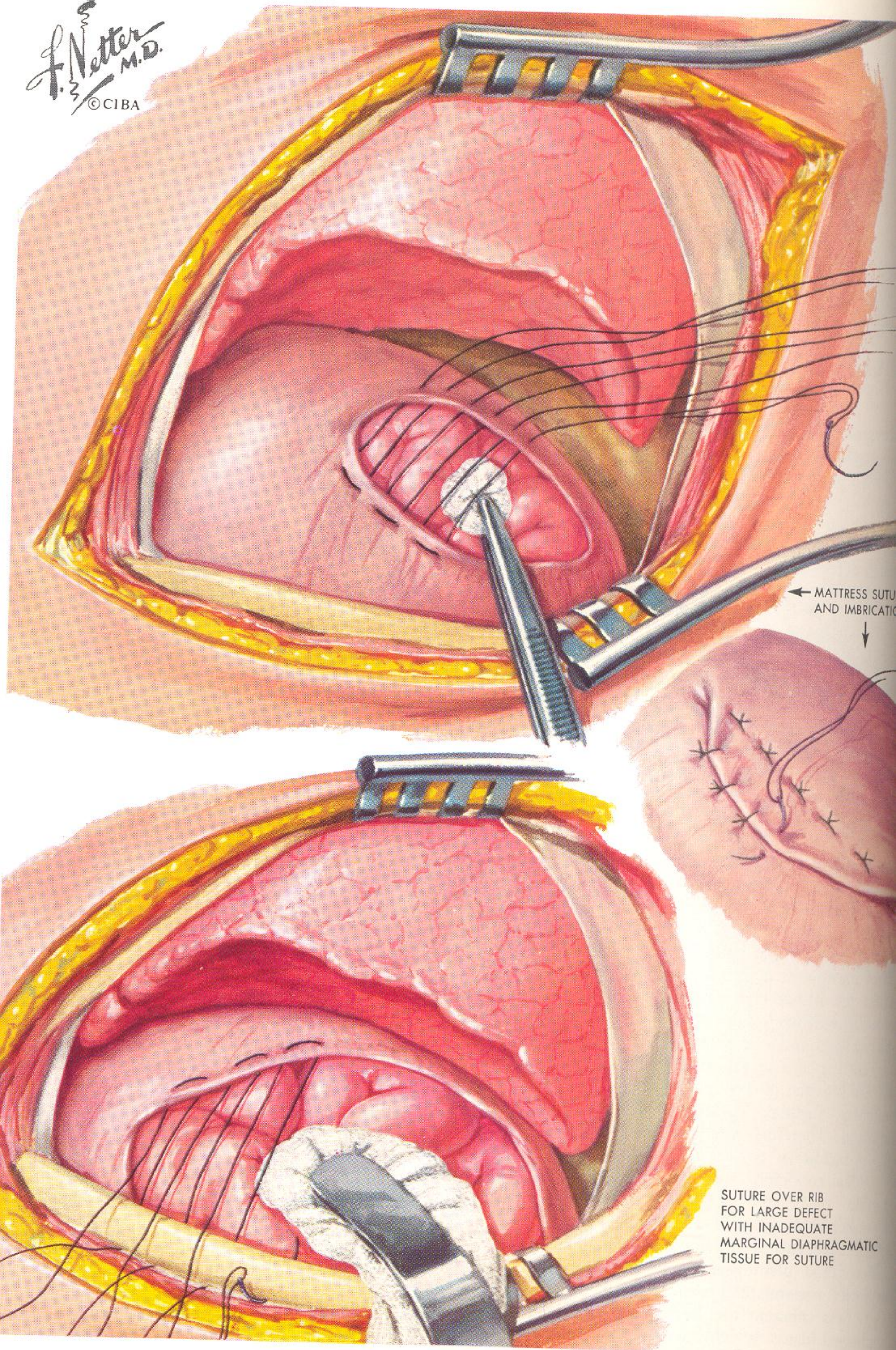
LARGE BOWEL

SPLEEN

HERNIATION OF ABDOMINAL
VISCERA INTO THORAX;
DISPLACEMENT AND
COMPRESSION OF
THORACIC VISCERA

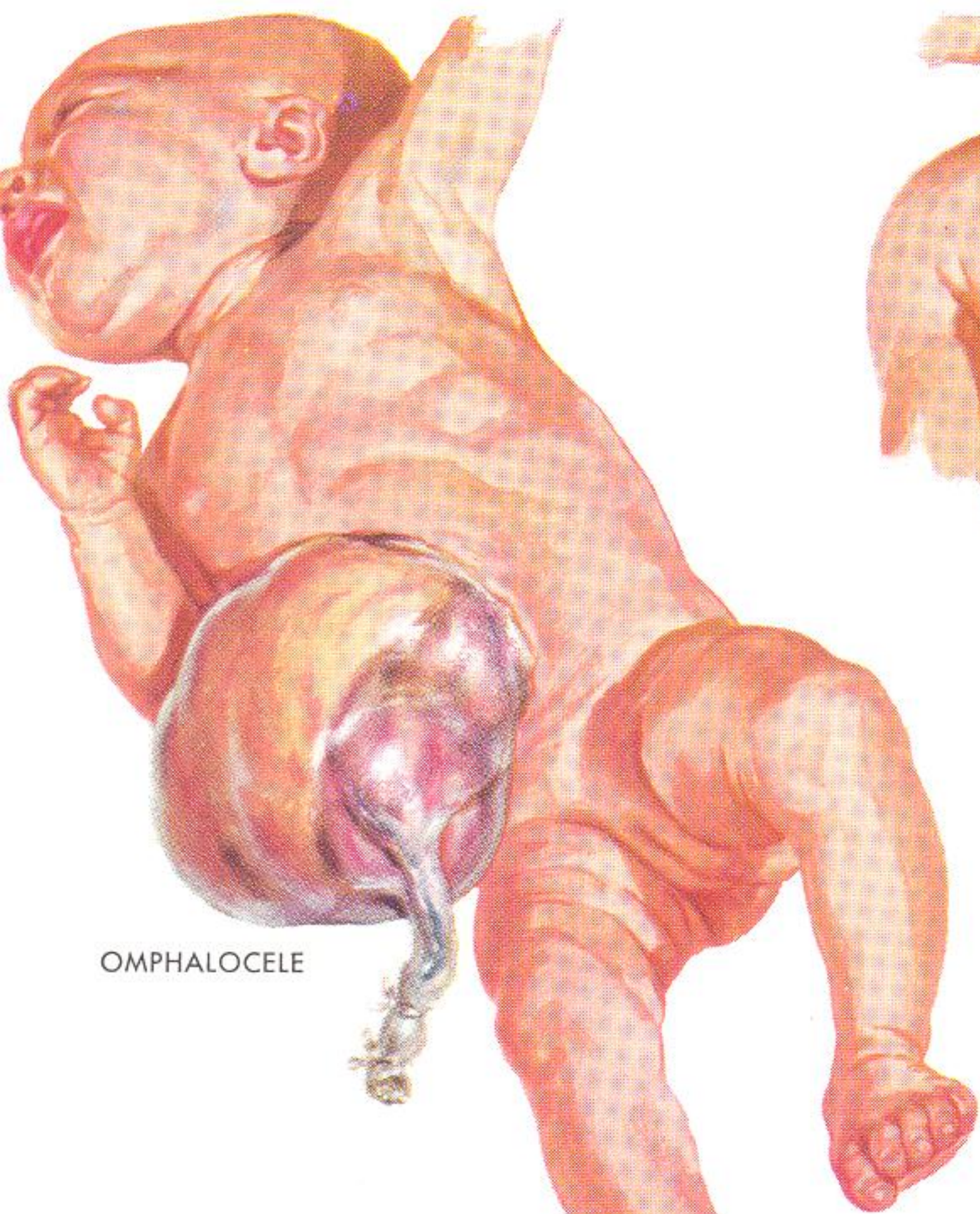
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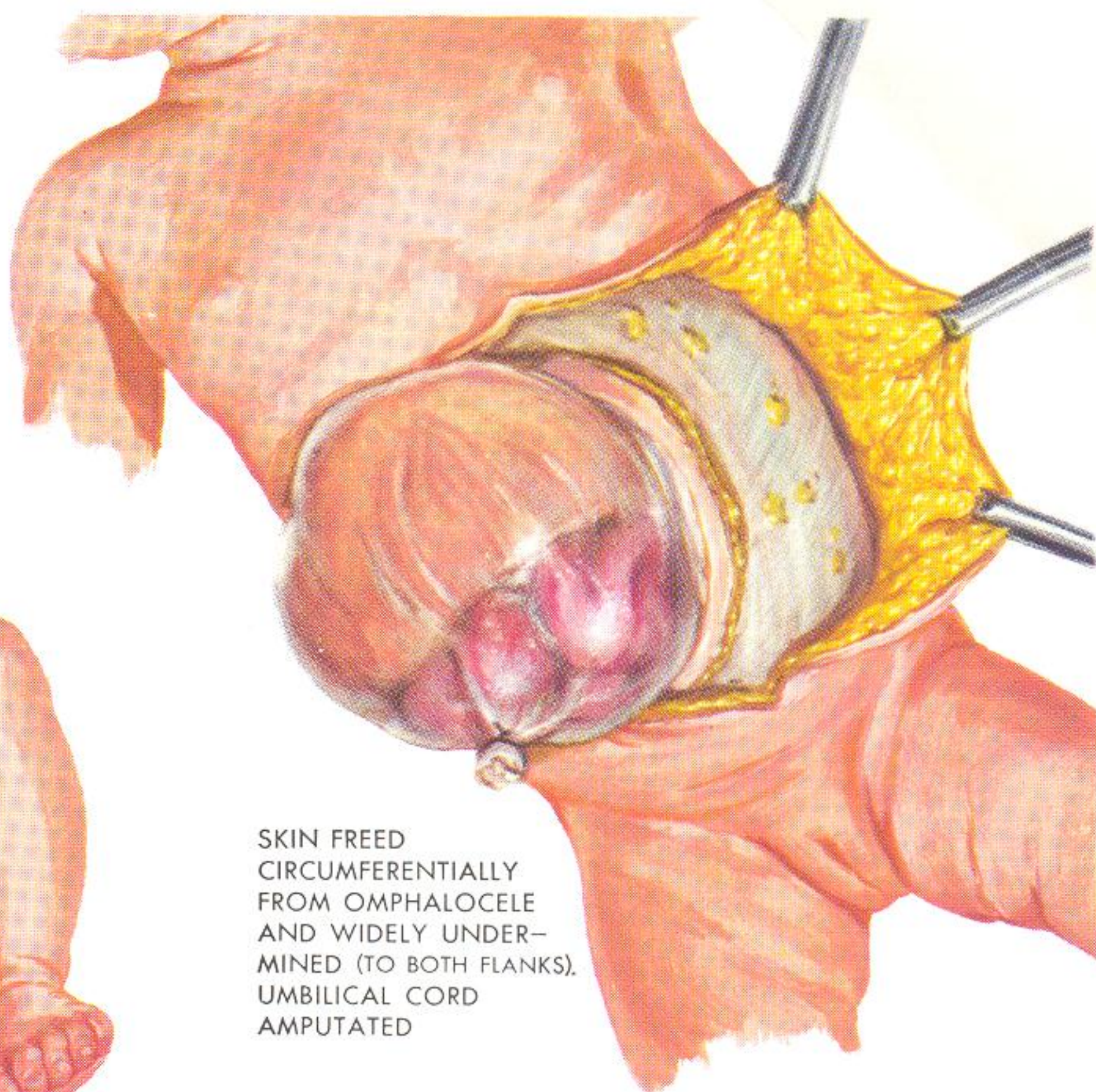


← MATTRESS SUTURE
AND IMBRICATION

SUTURE OVER RIB
FOR LARGE DEFECT
WITH INADEQUATE
MARGINAL DIAPHRAGMATIC
TISSUE FOR SUTURE

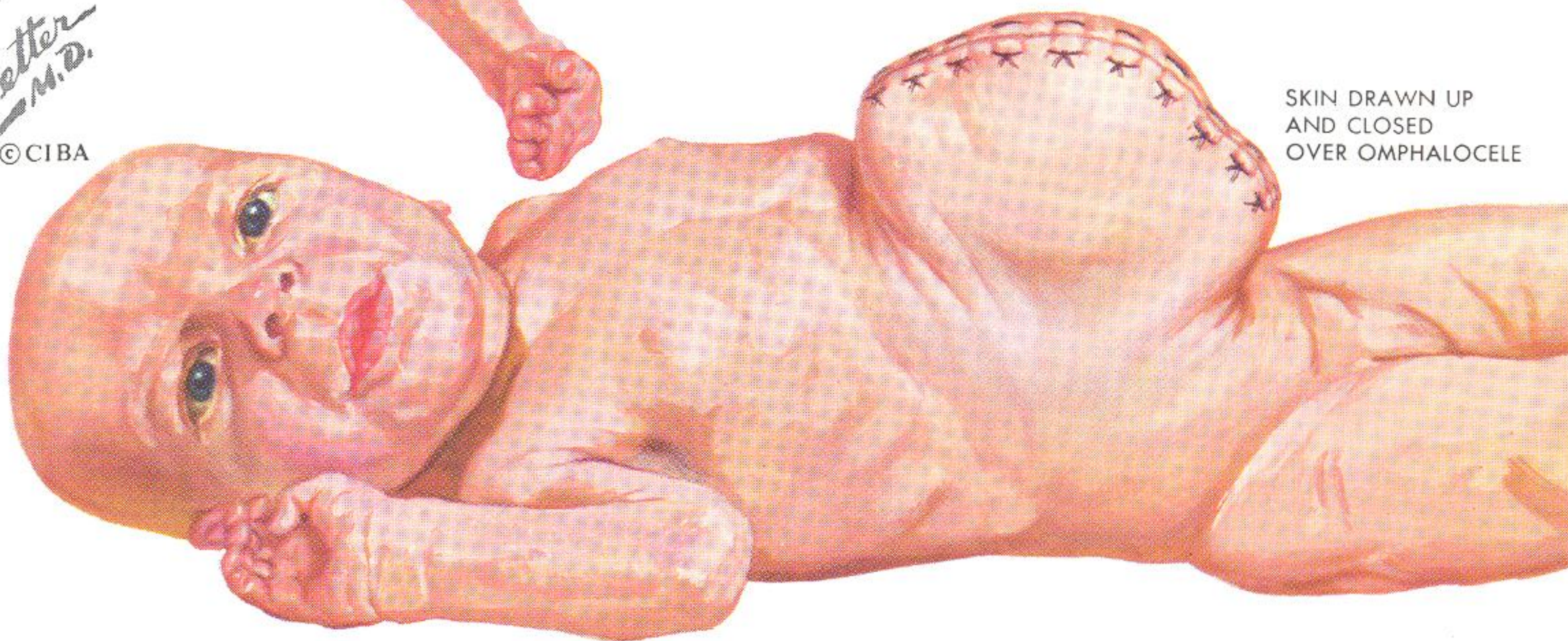


OMPHALOCELE



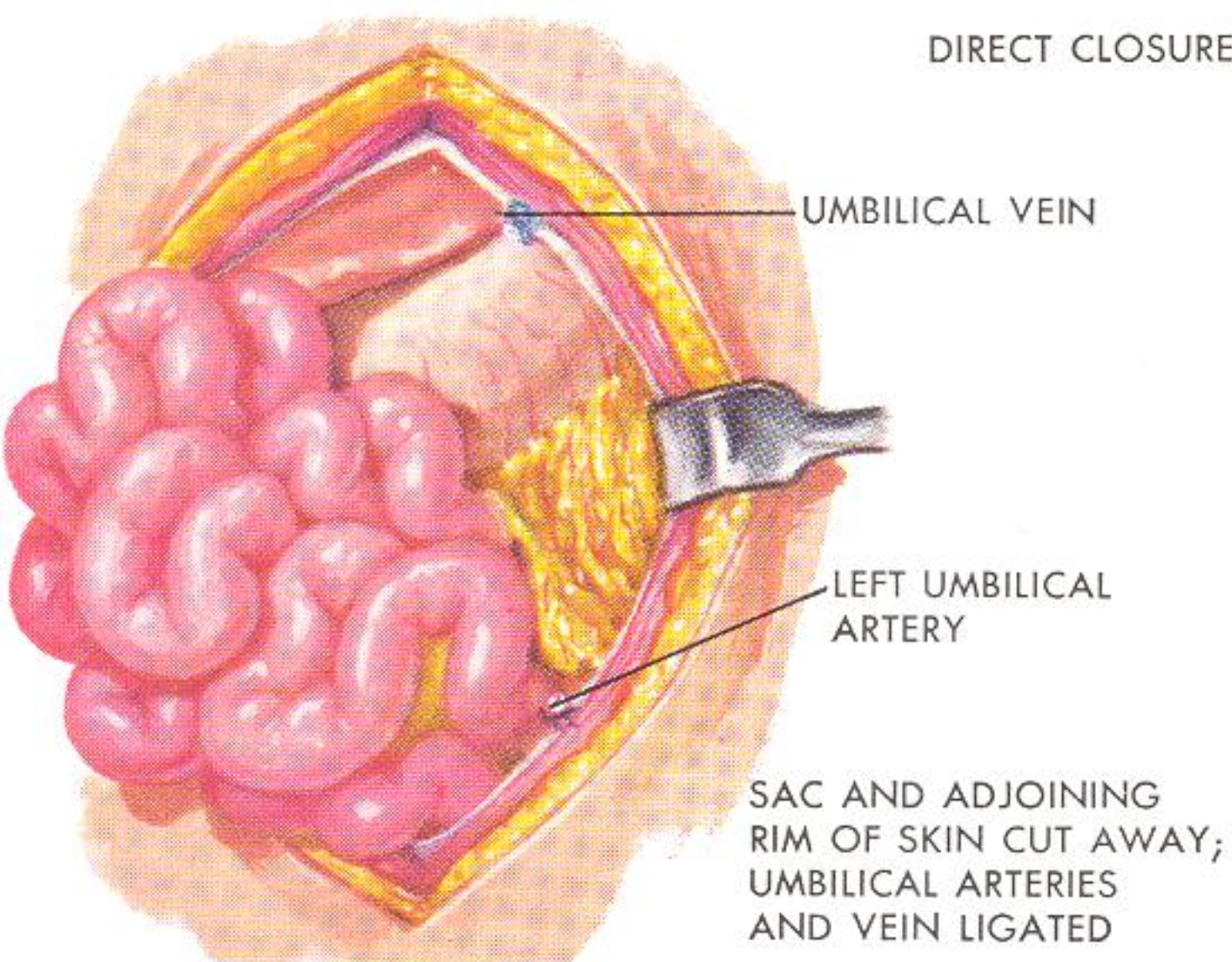
SKIN FREED
CIRCUMFERENTIALLY
FROM OMPHALOCELE
AND WIDELY UNDER-
MINED (TO BOTH FLANKS).
UMBILICAL CORD
AMPUTATED

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SKIN DRAWN UP
AND CLOSED
OVER OMPHALOCELE

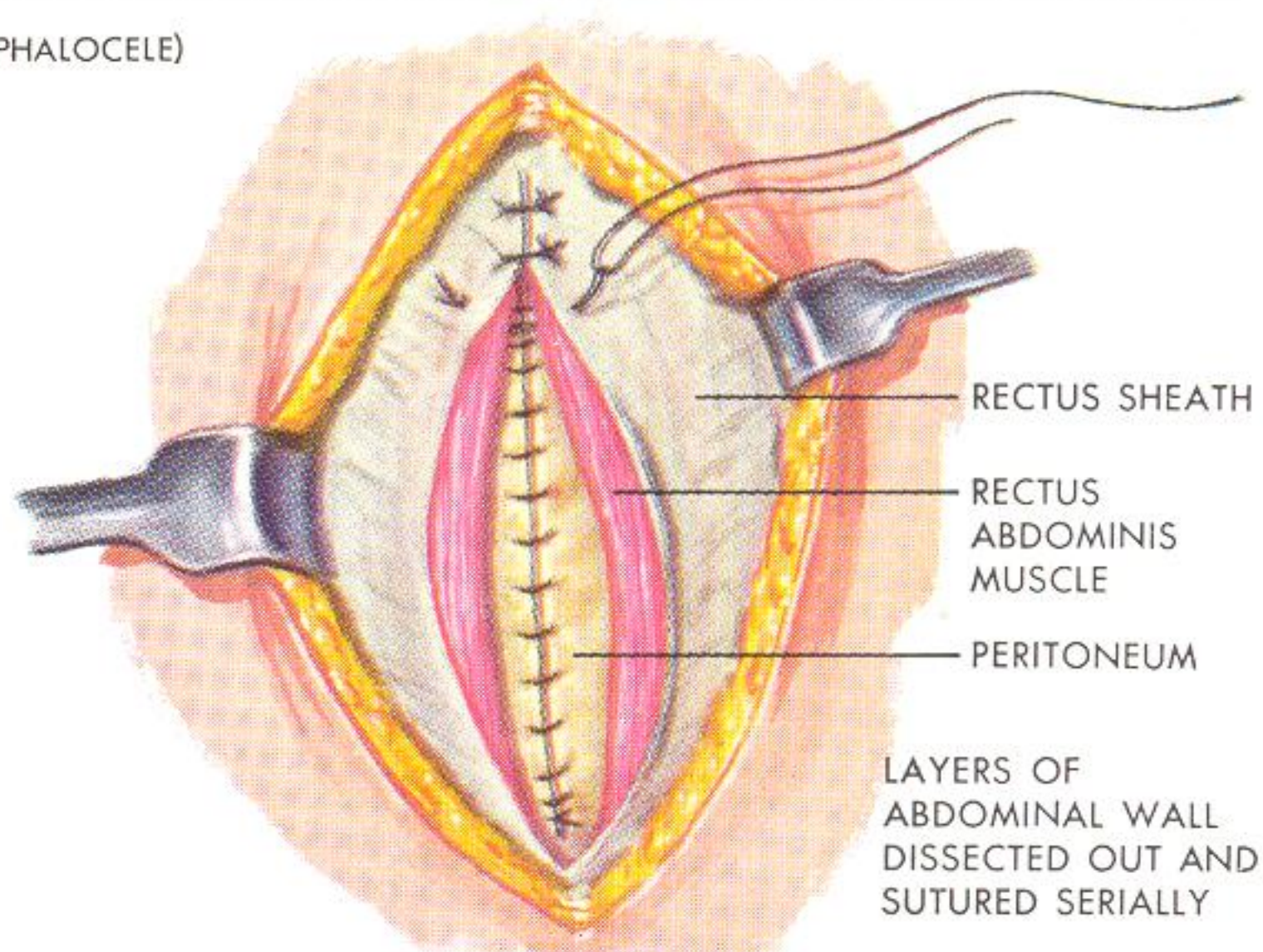
DIRECT CLOSURE (SMALL OMPHALOCELE)



UMBILICAL VEIN

LEFT UMBILICAL
ARTERY

SAC AND ADJOINING
RIM OF SKIN CUT AWAY;
UMBILICAL ARTERIES
AND VEIN LIGATED



RECTUS SHEATH

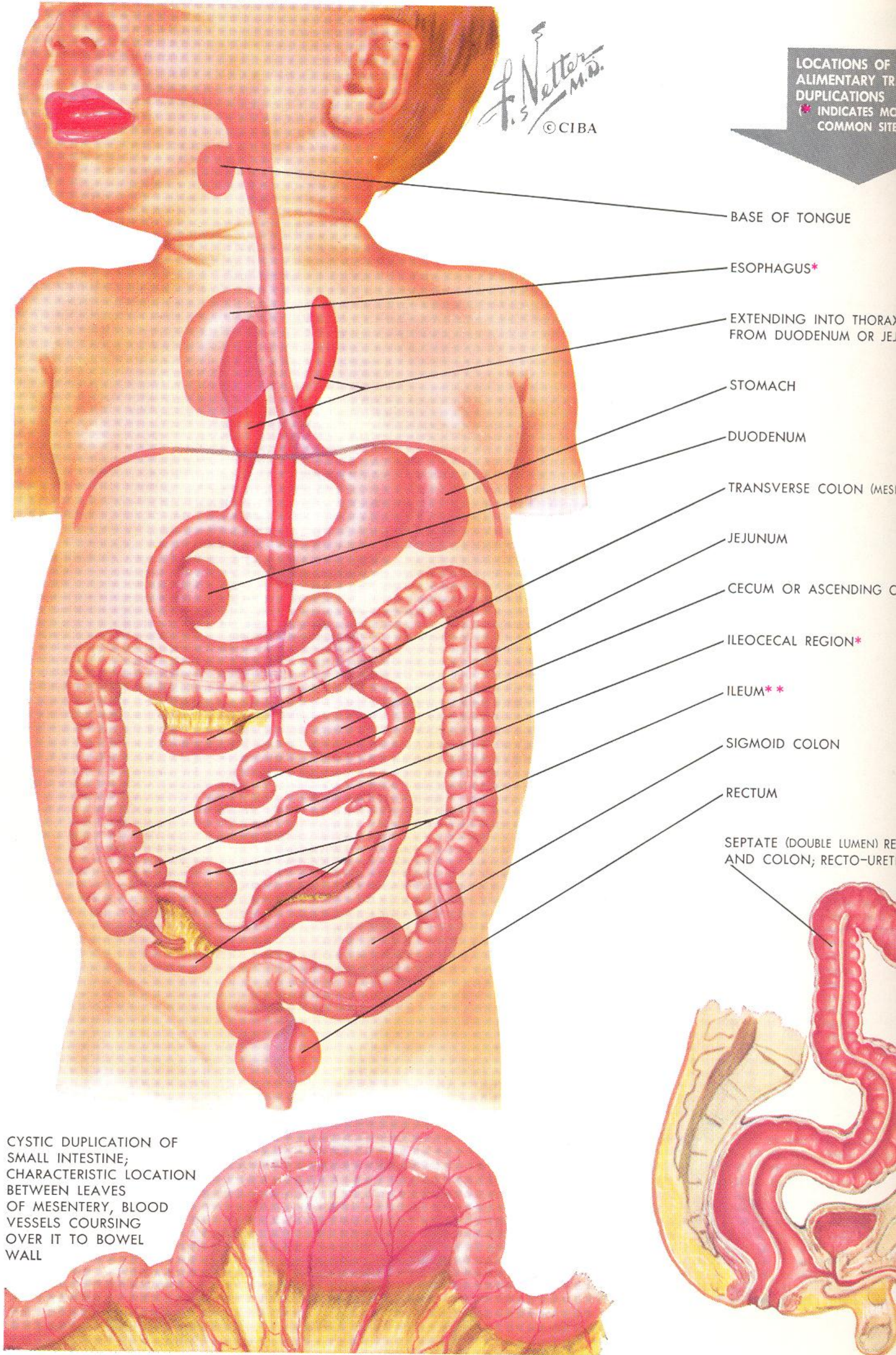
RECTUS
ABDOMINIS
MUSCLE

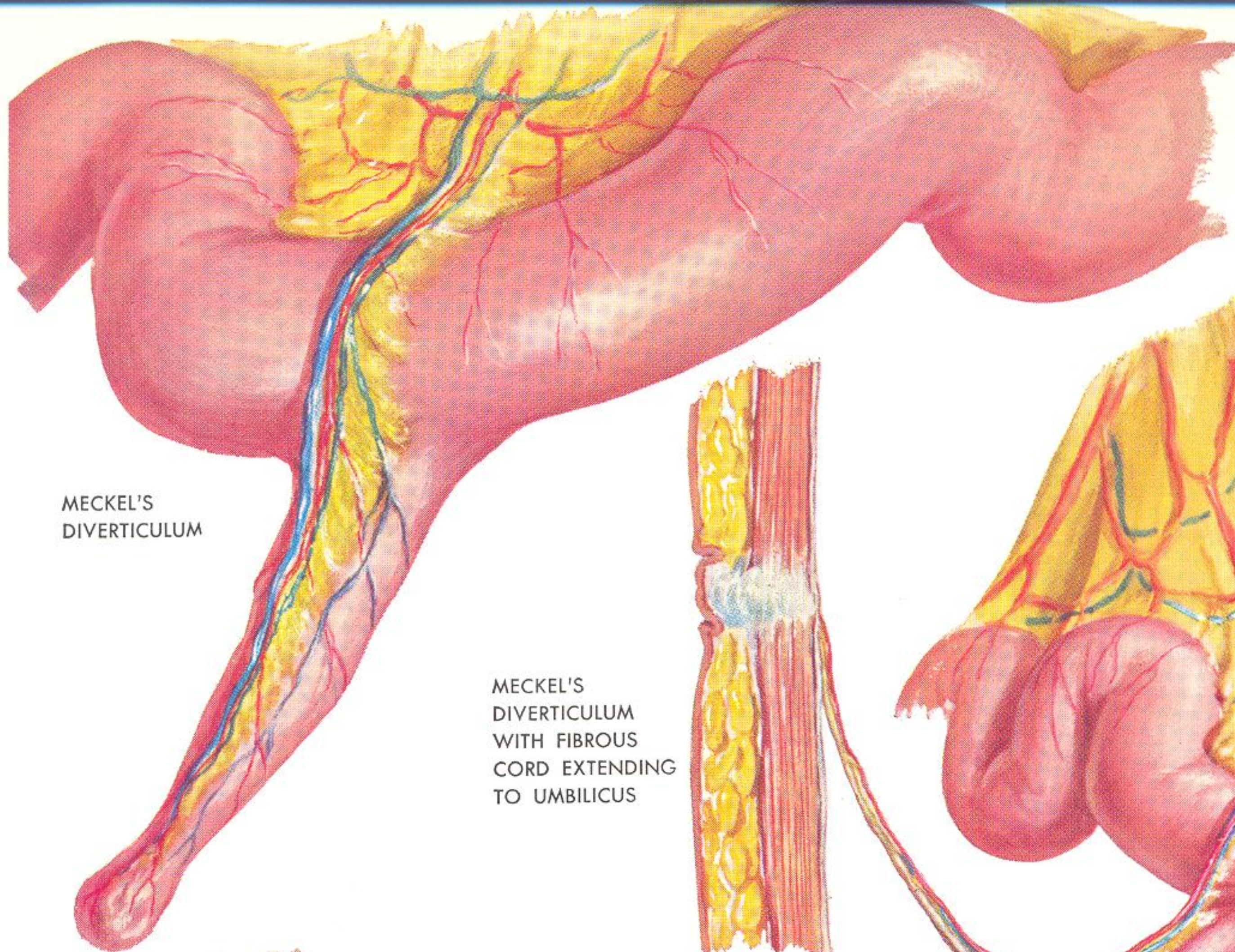
PERITONEUM

LAYERS OF
ABDOMINAL WALL
DISSECTED OUT AND
SUTURED SERIALY

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LOCATIONS OF
ALIMENTARY TRACT
DUPLICATIONS
* INDICATES MOST
COMMON SITE

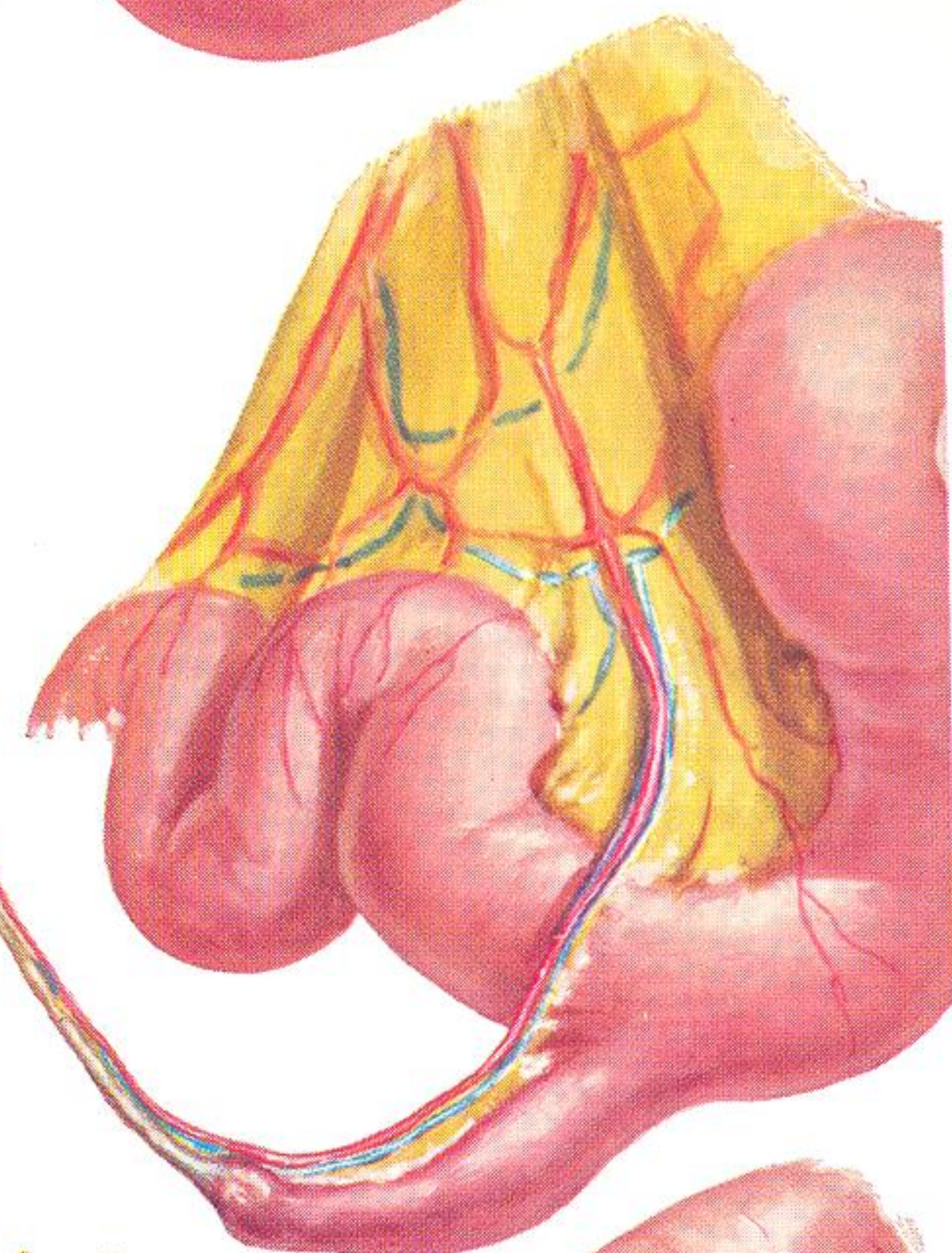




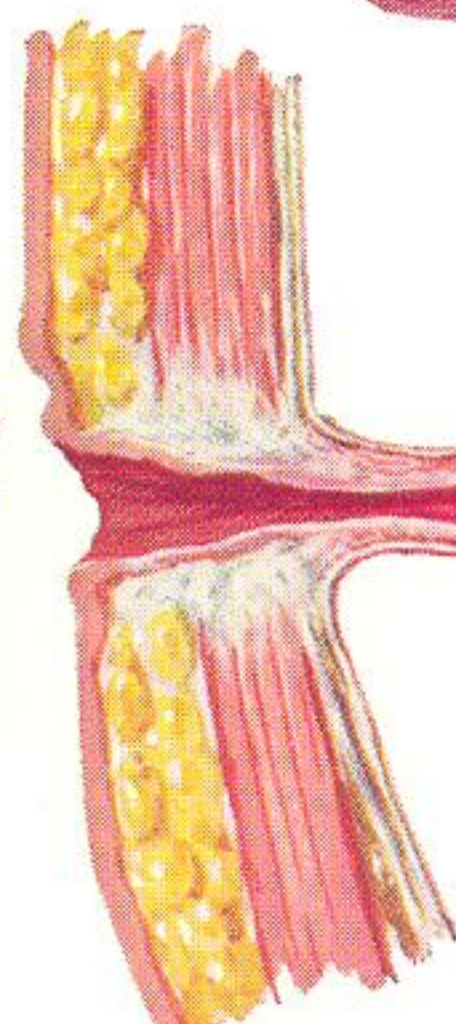
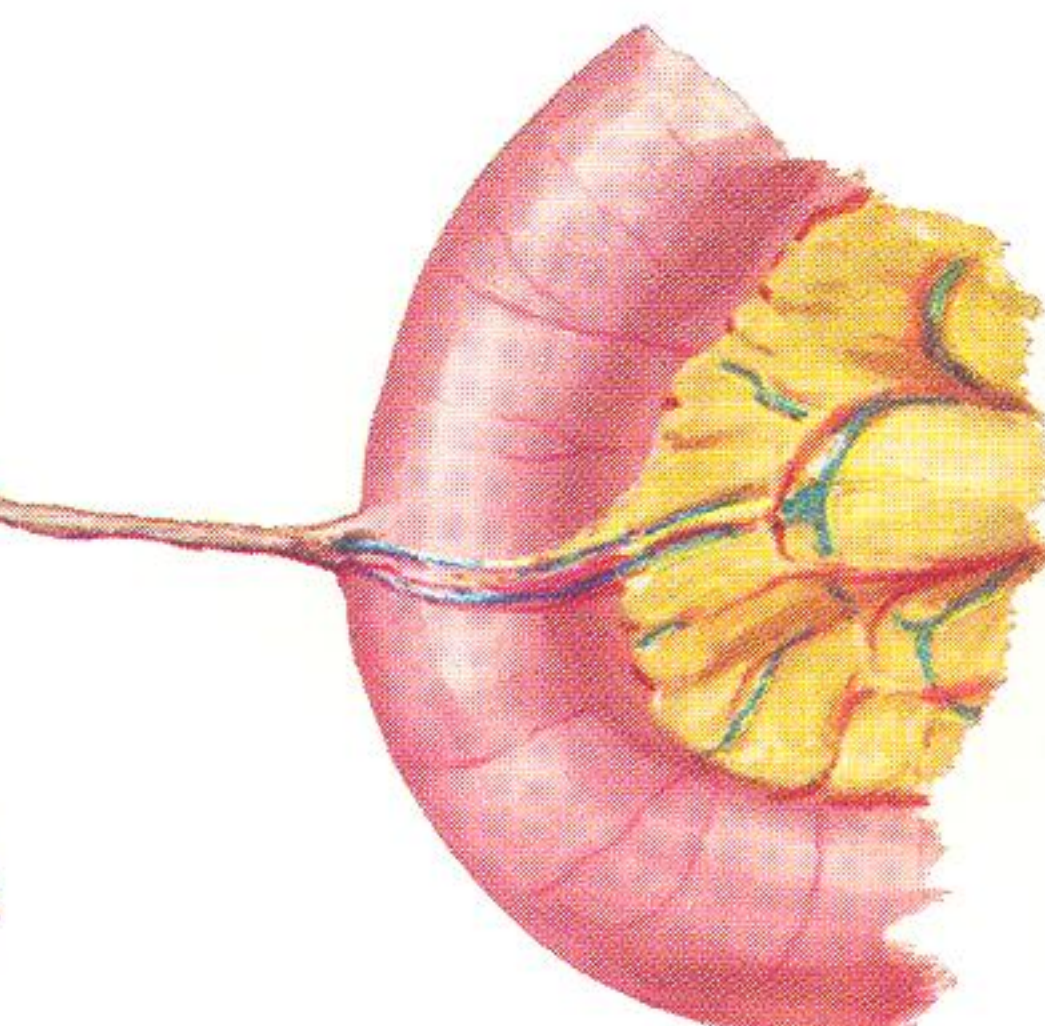
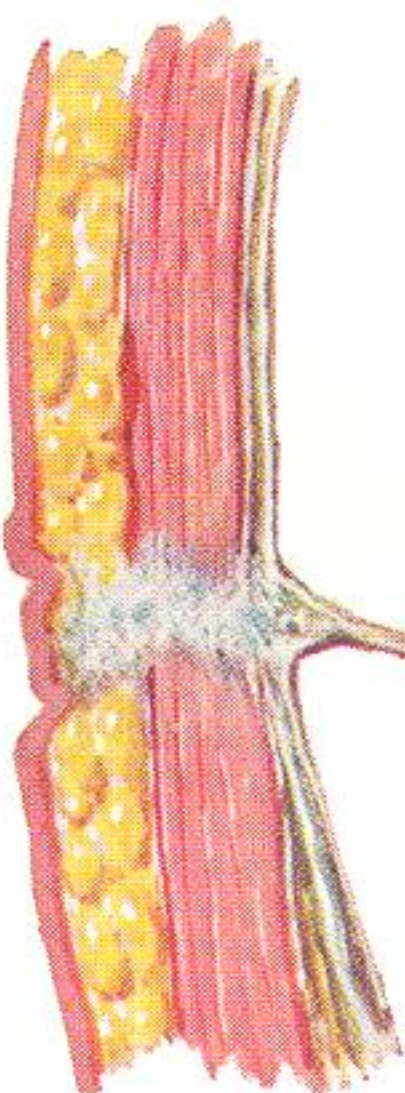
MECKEL'S
DIVERTICULUM



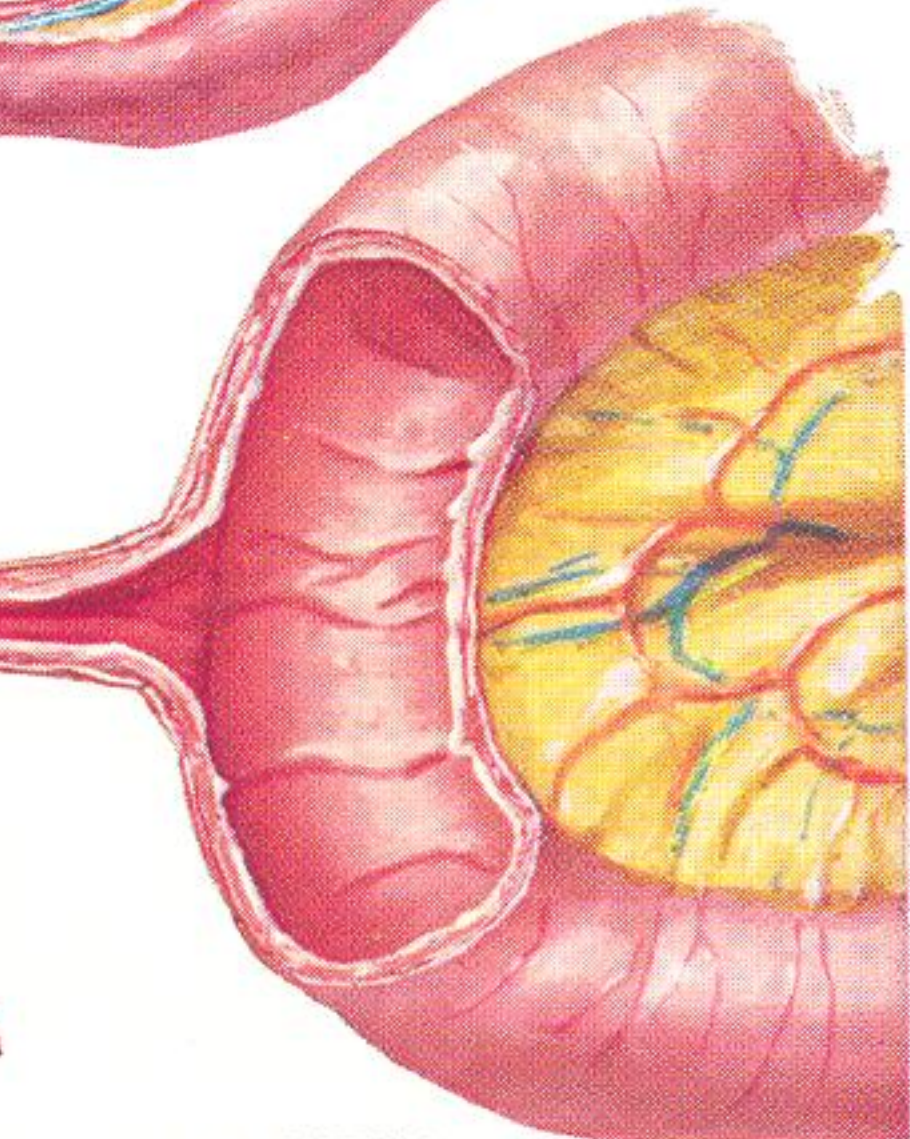
MECKEL'S
DIVERTICULUM
WITH FIBROUS
CORD EXTENDING
TO UMBILICUS



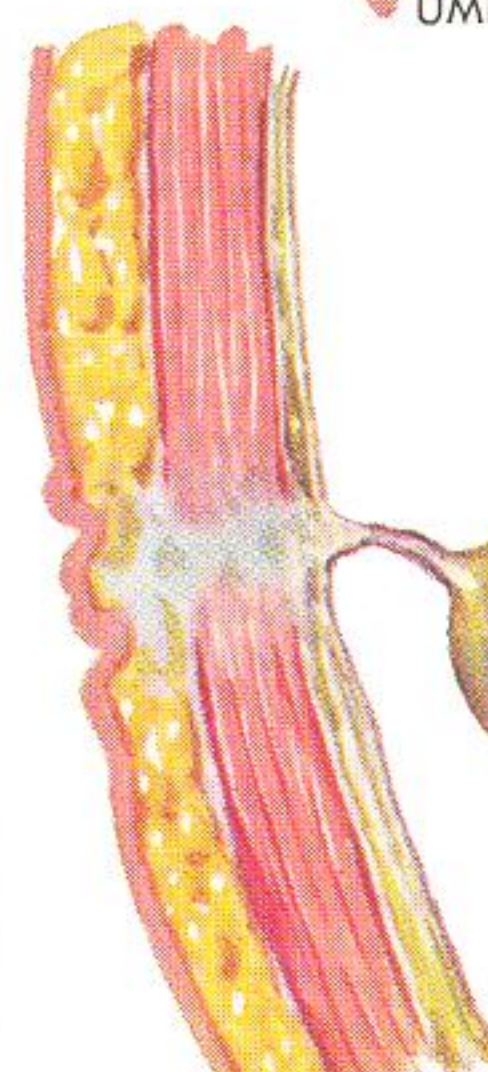
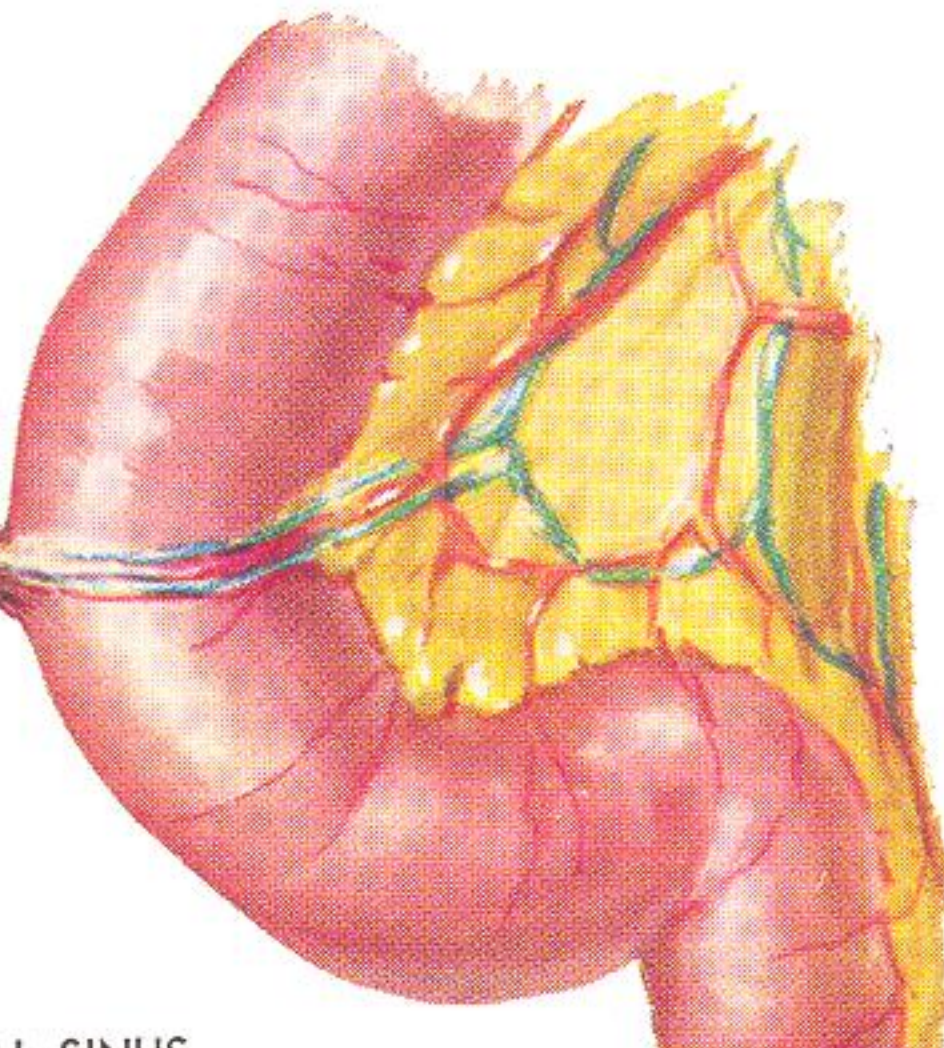
FIBROUS CORD
CONNECTING
SMALL INTESTINE
WITH UMBILICUS



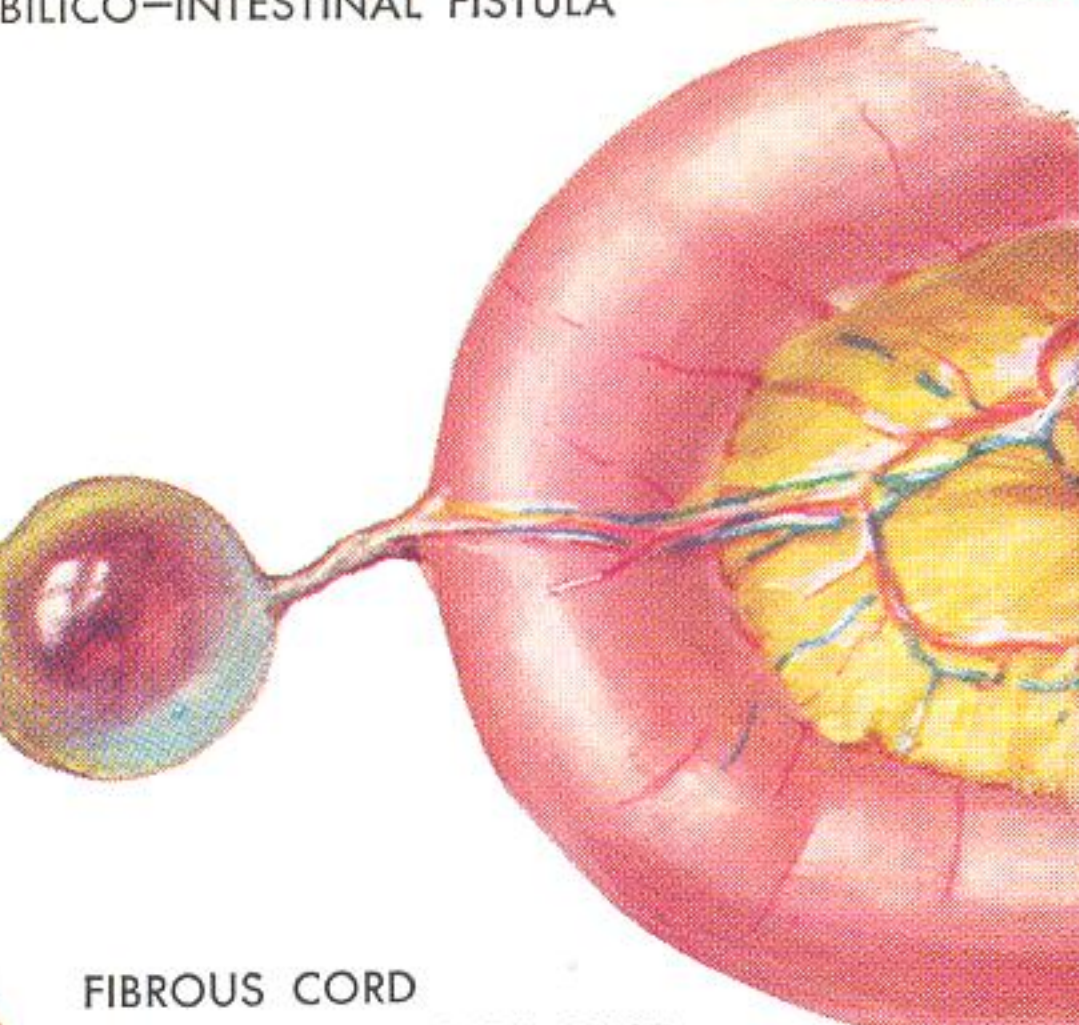
UMBILICO-INTESTINAL FISTULA

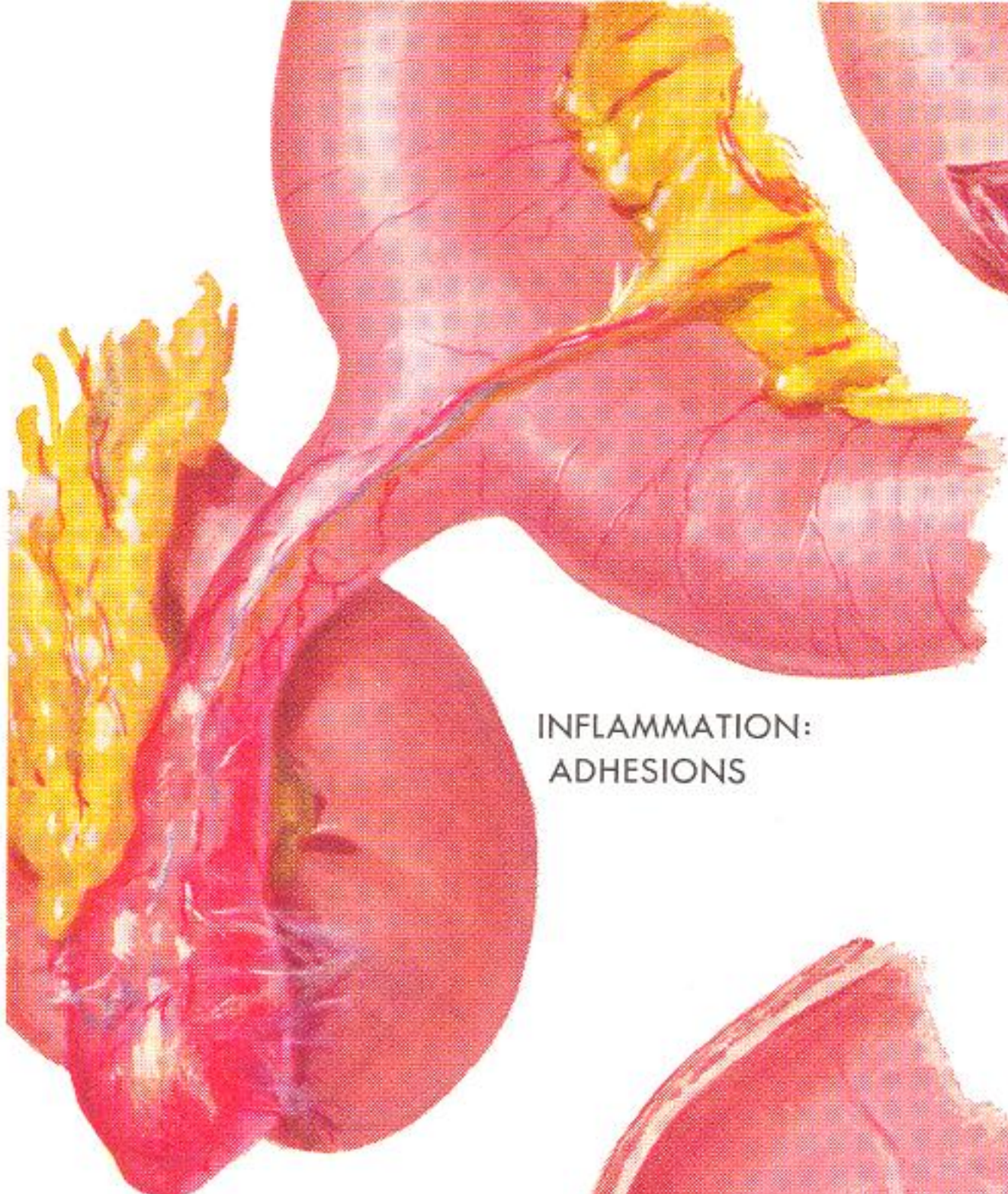


UMBILICAL SINUS

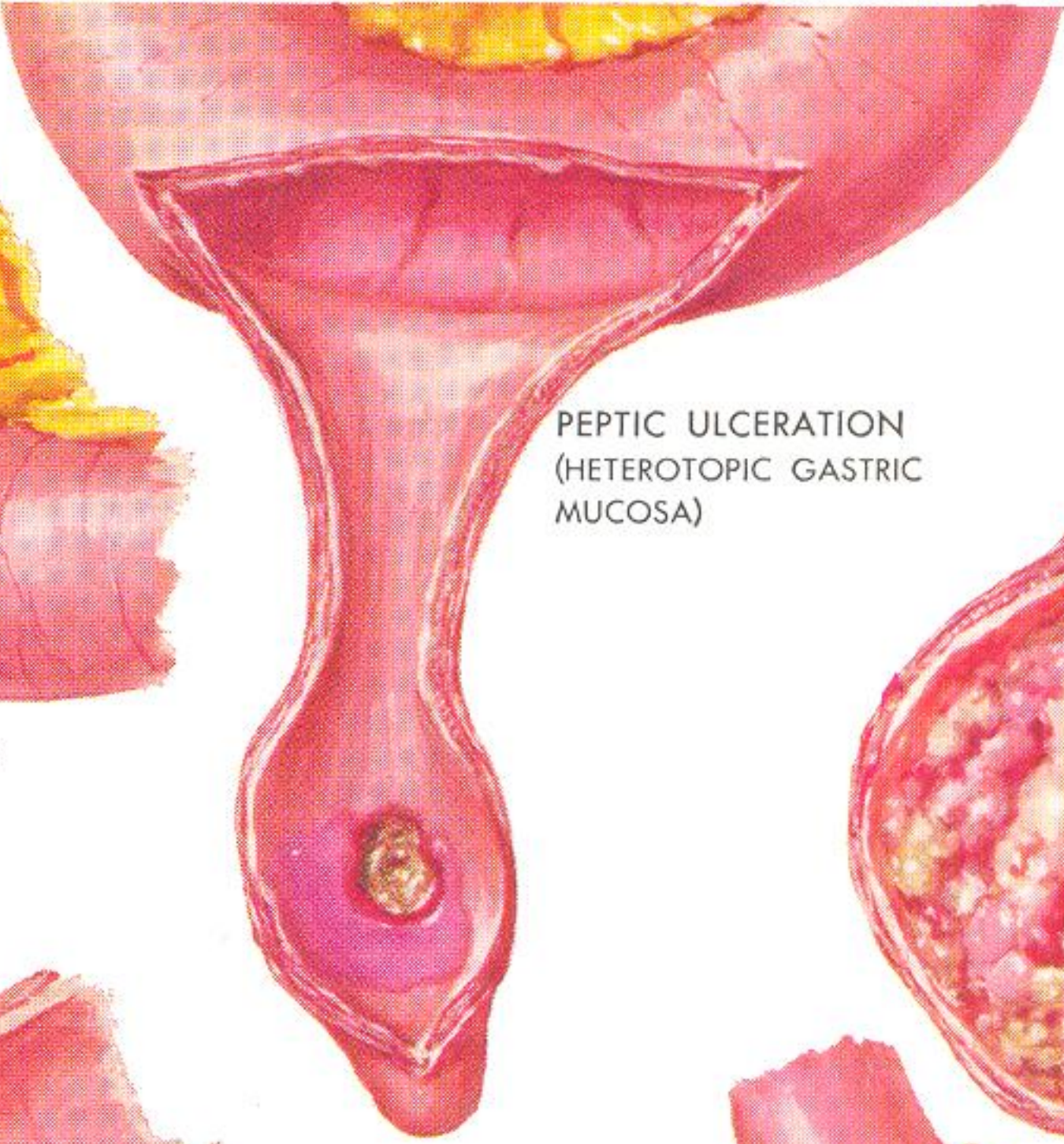


FIBROUS CORD
WITH INTERMEDIATE CYST

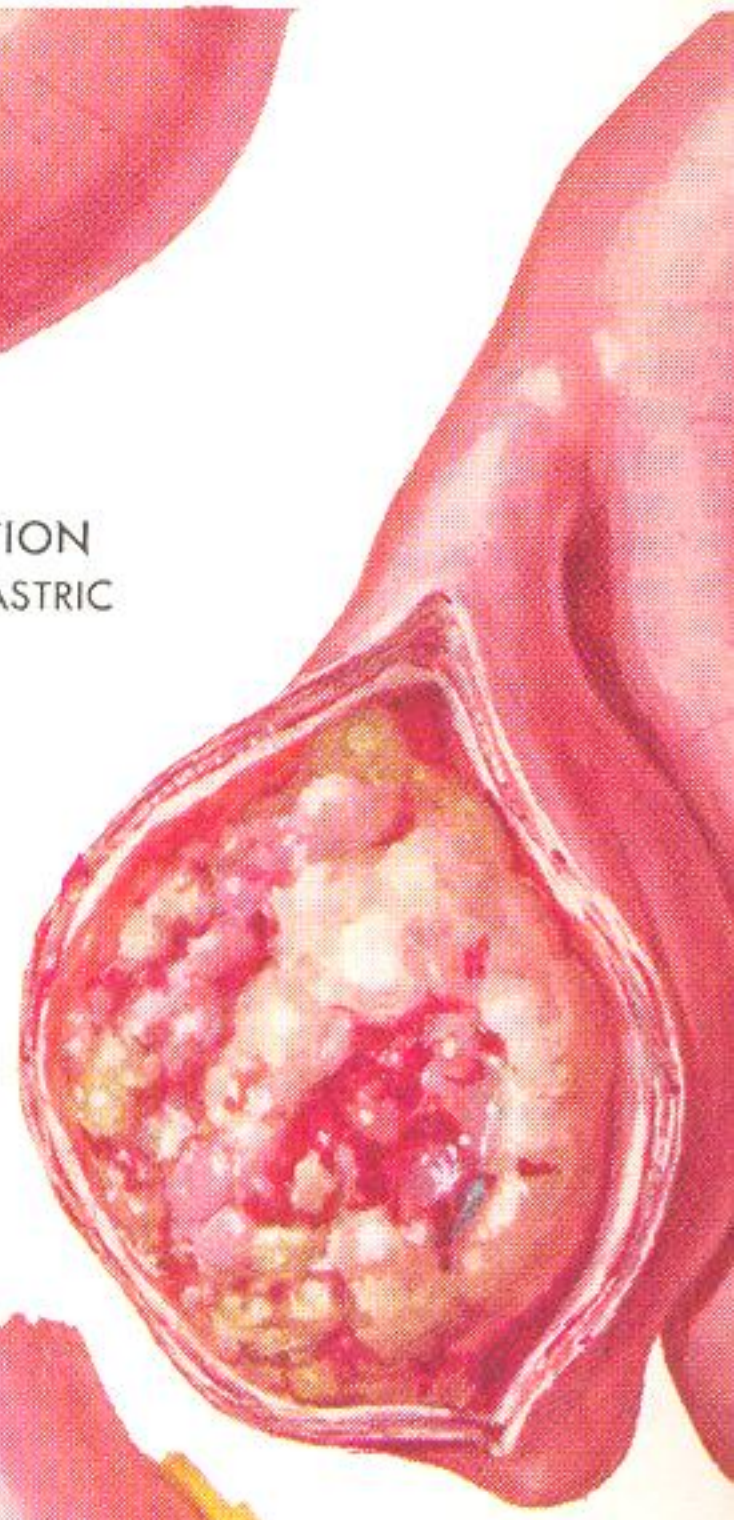




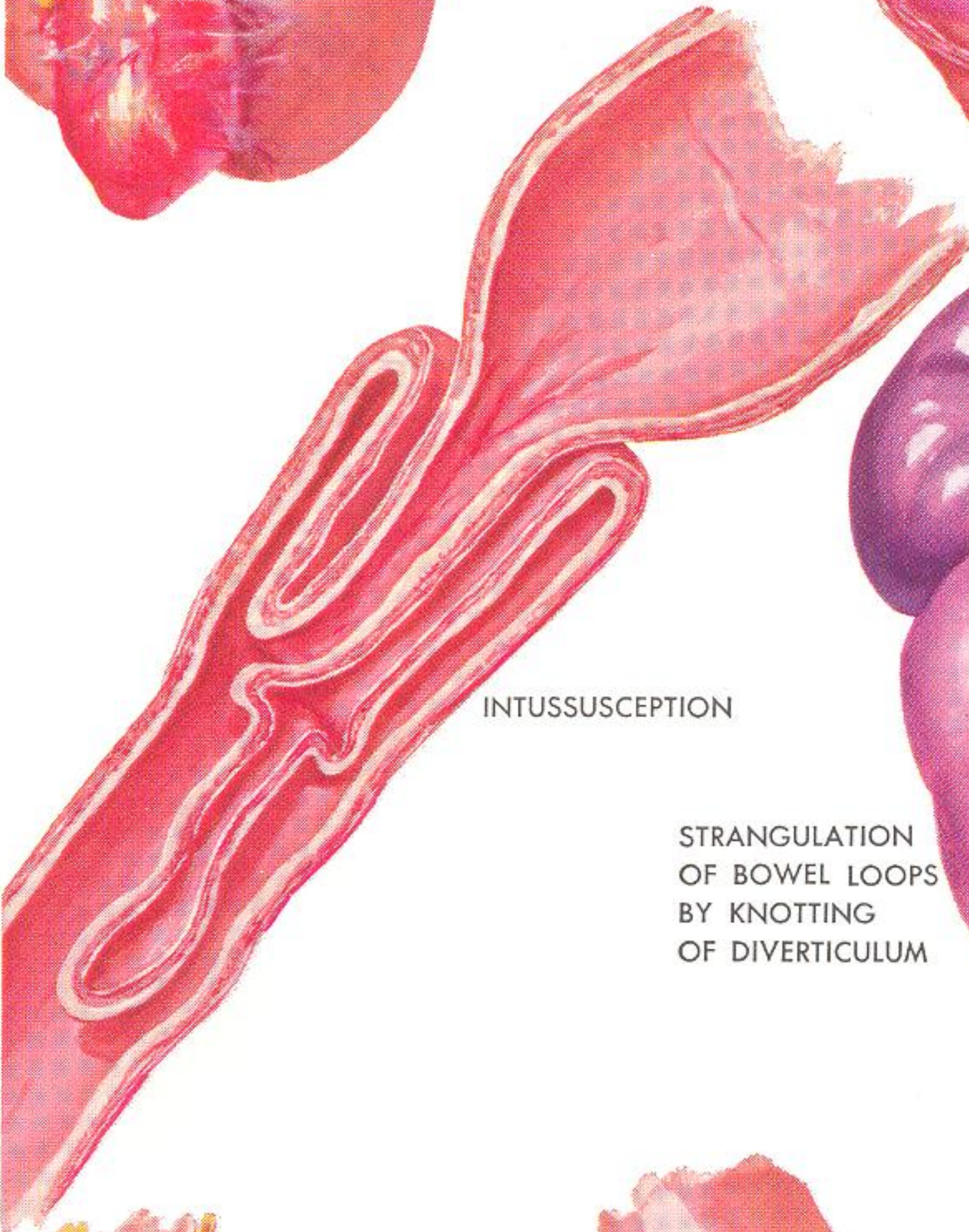
INFLAMMATION:
ADHESIONS



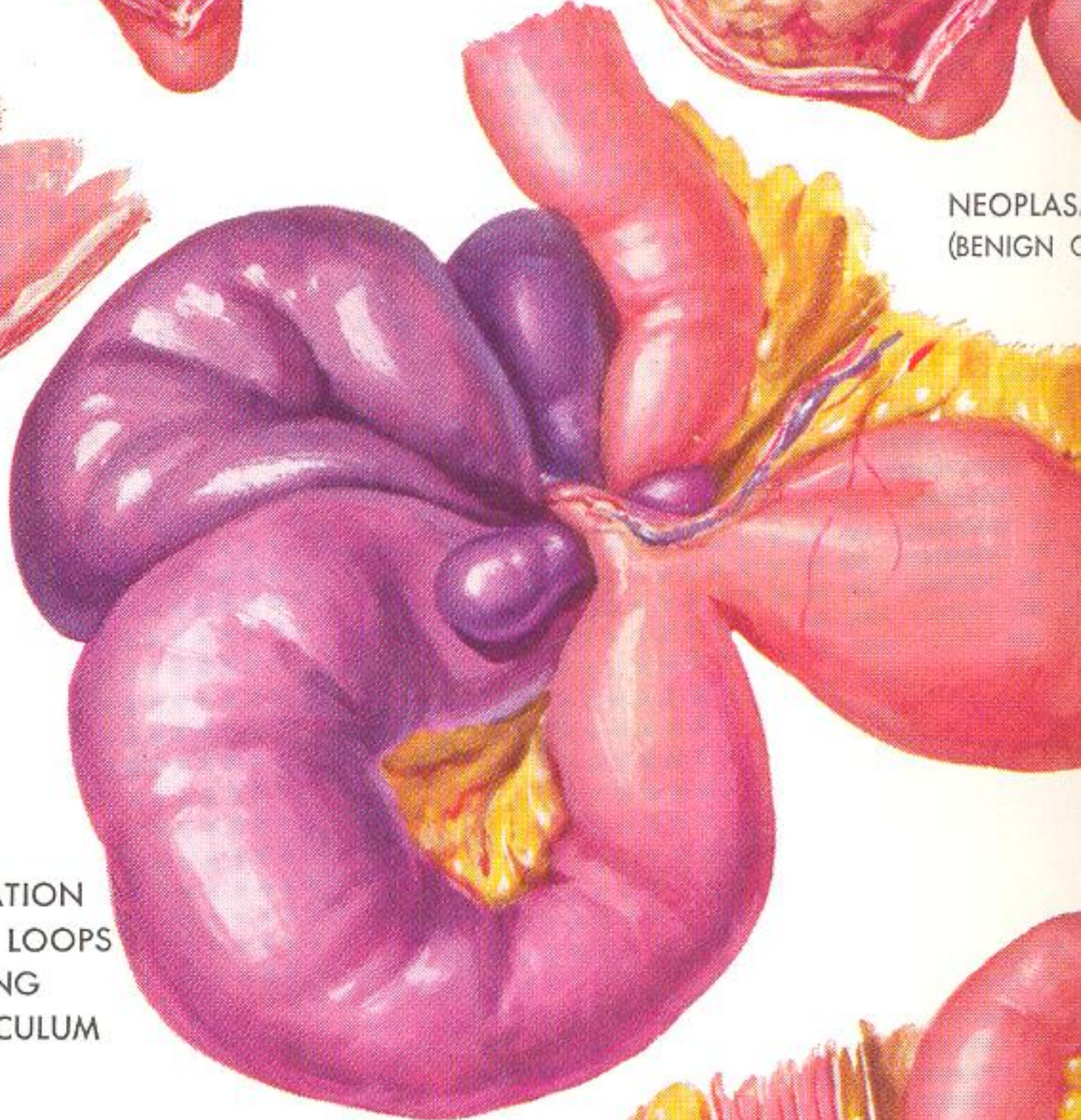
PEPTIC ULCERATION
(HETEROTOPIC GASTRIC
MUCOSA)



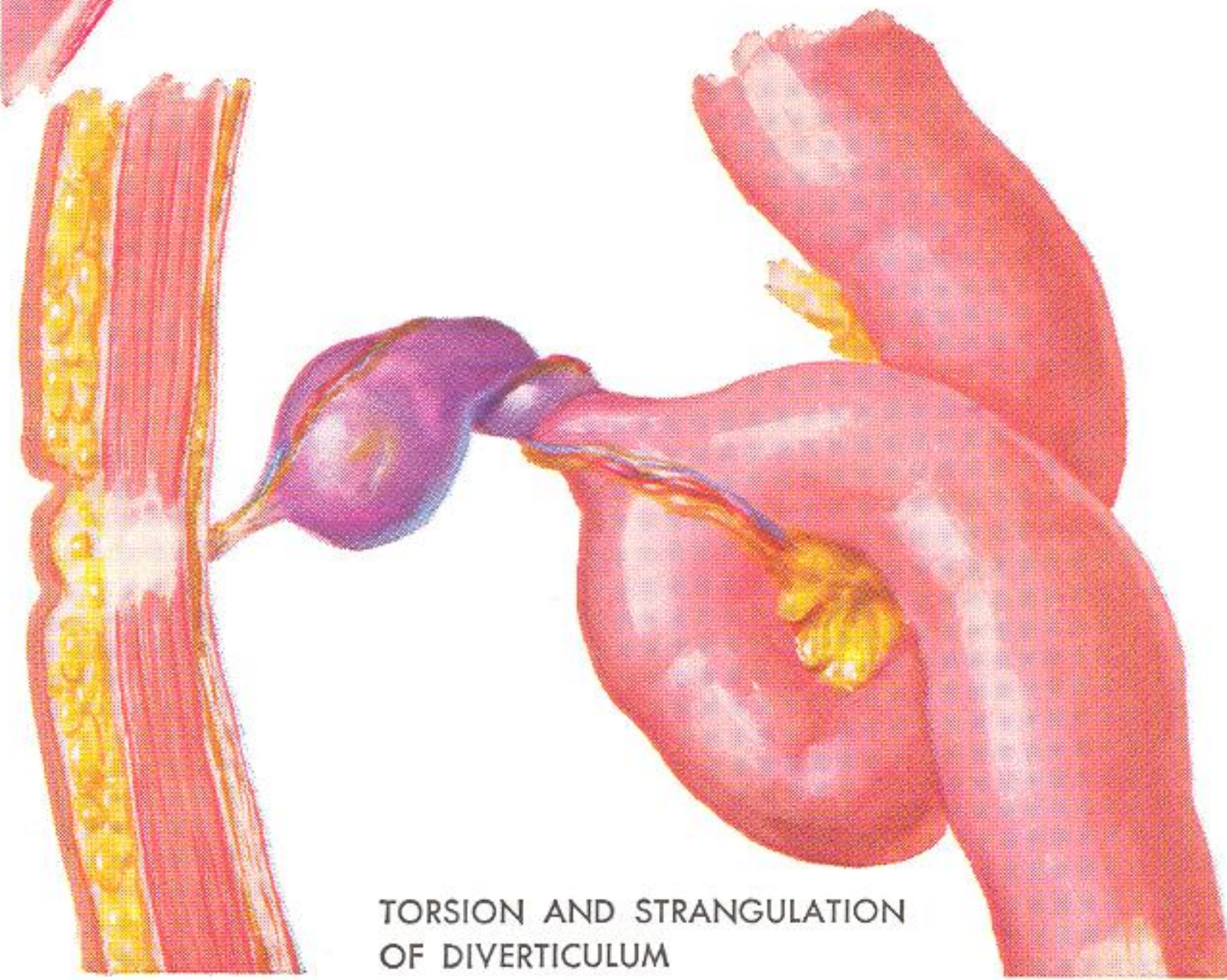
NEOPLASIA
(BENIGN C)



INTUSSUSCEPTION

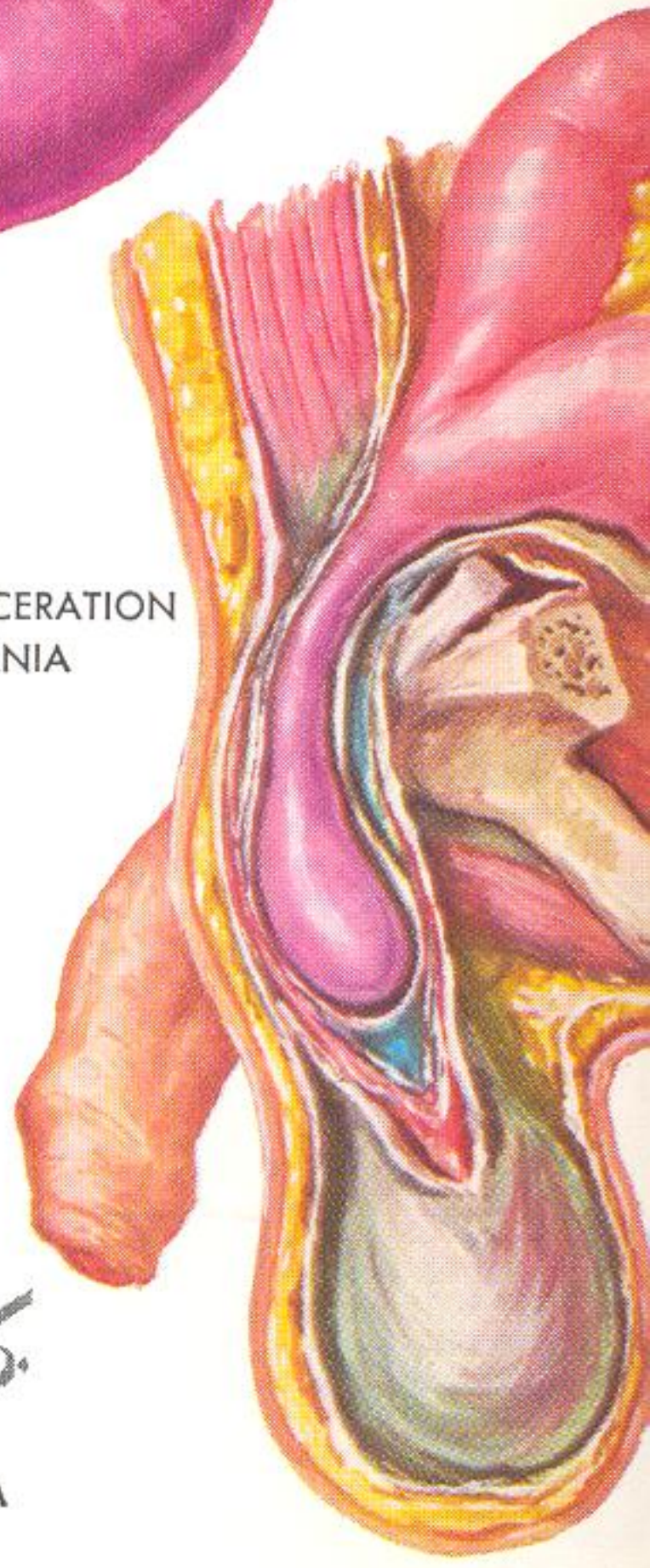


STRANGULATION
OF BOWEL LOOPS
BY KNOTTING
OF DIVERTICULUM

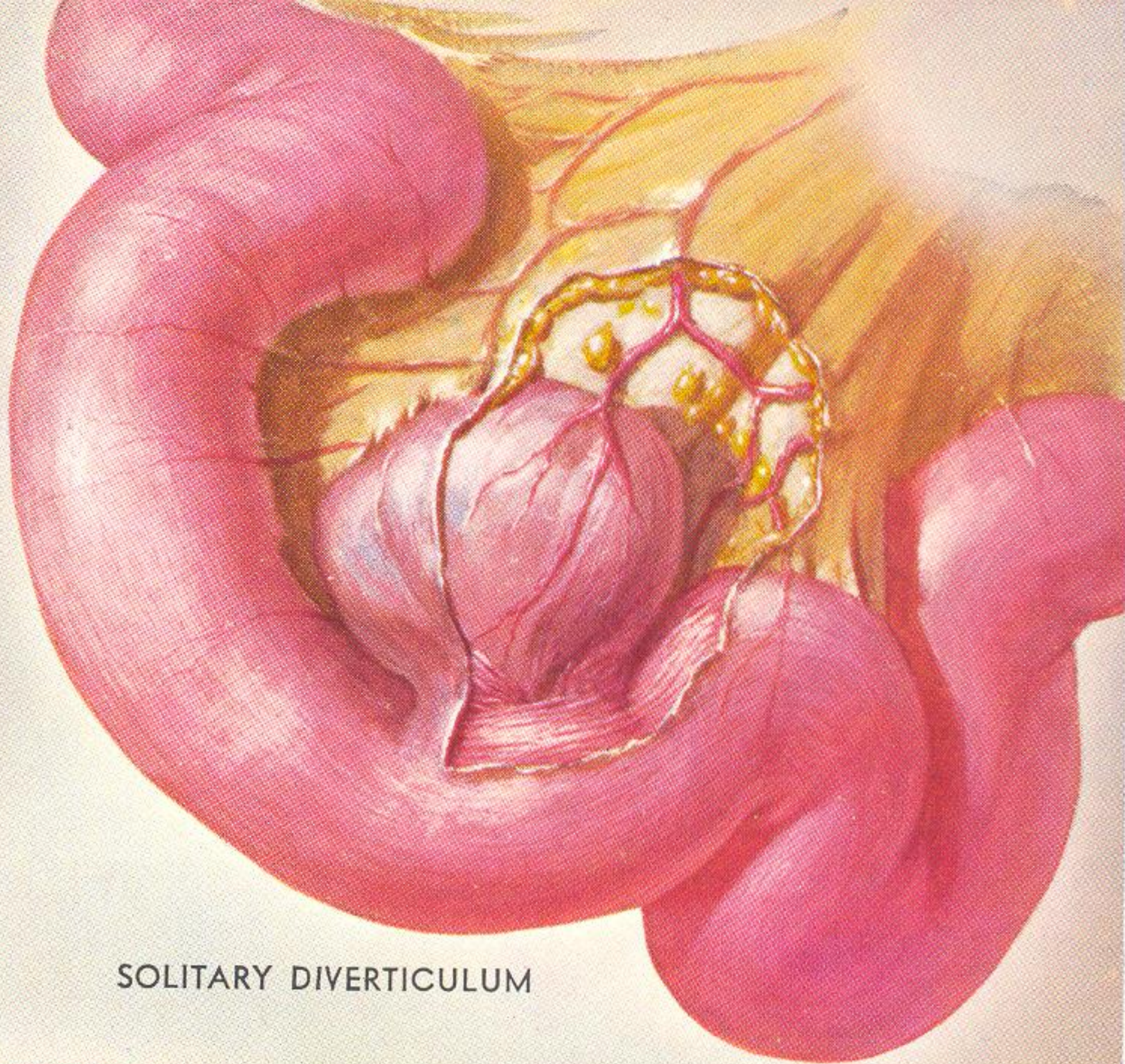
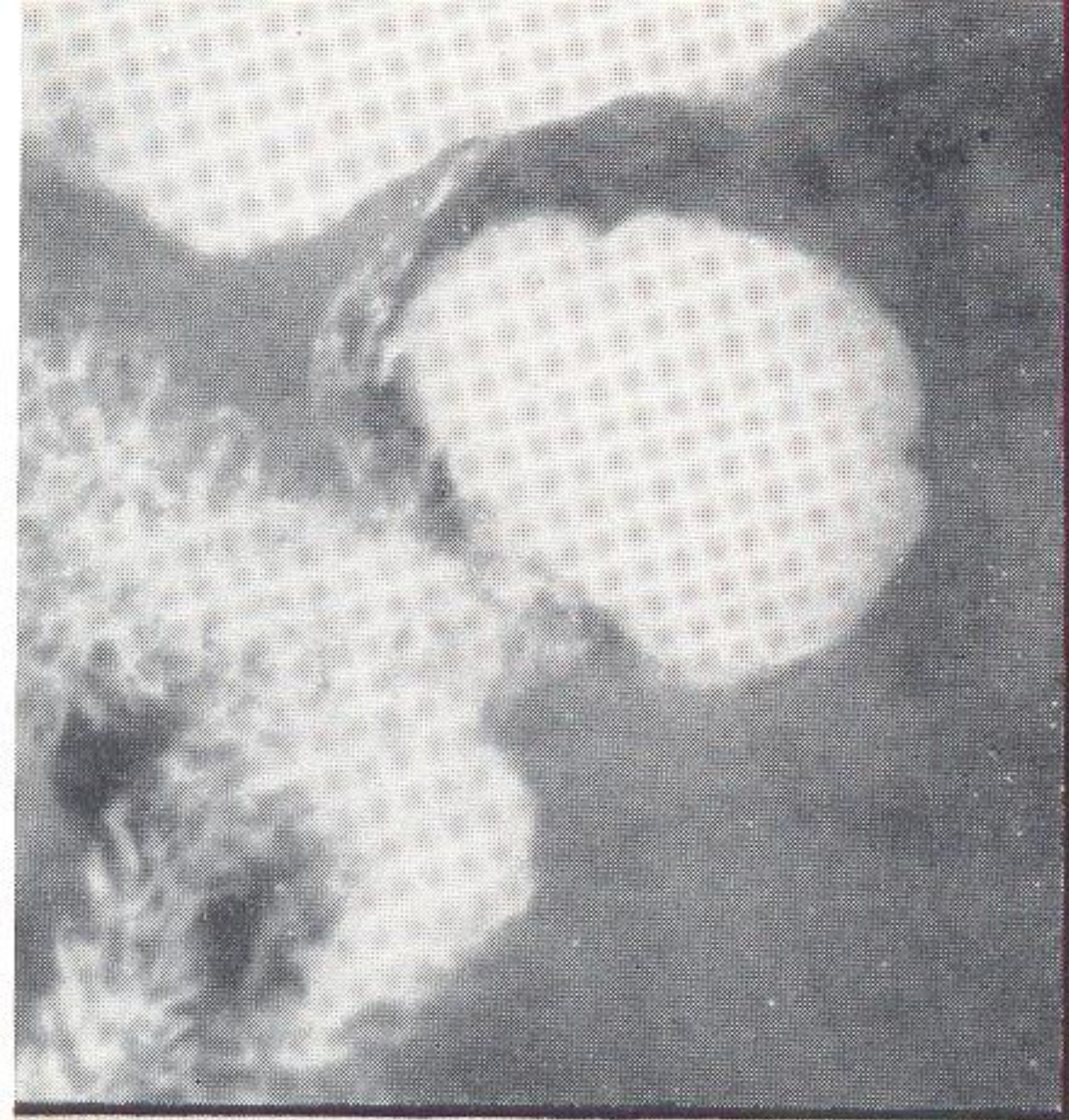


TORSION AND STRANGULATION
OF DIVERTICULUM

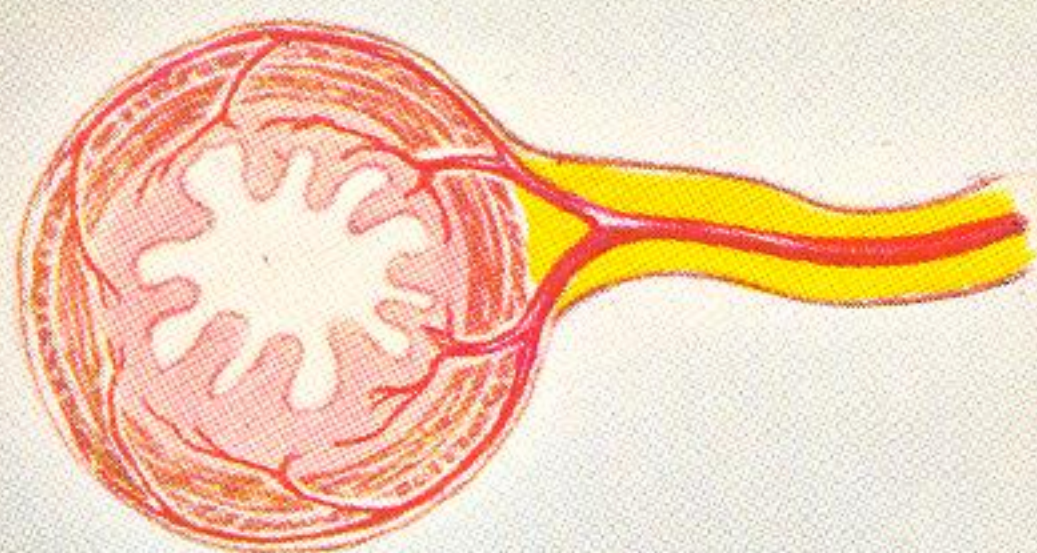
INCARCERATION
IN HERNIA



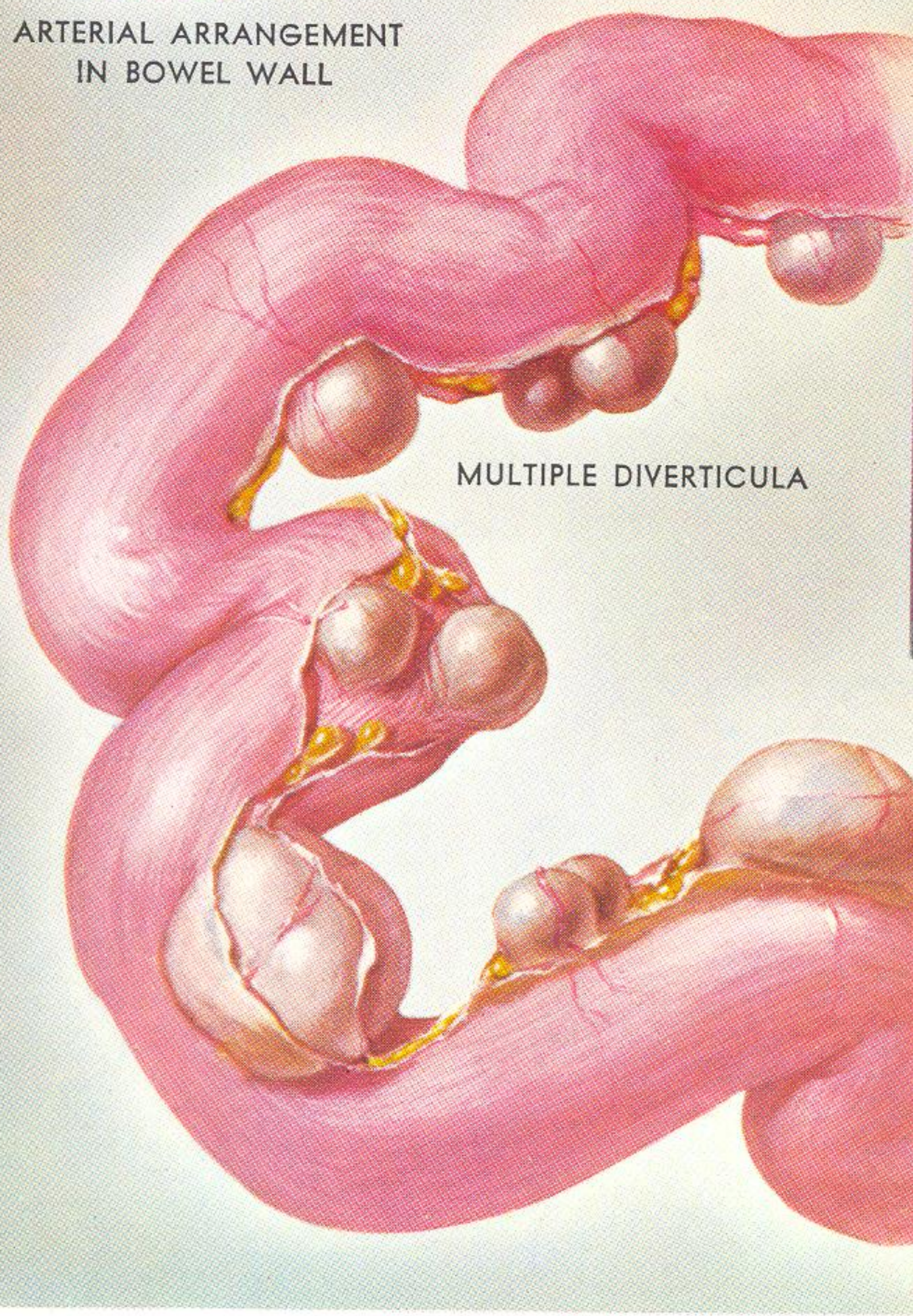
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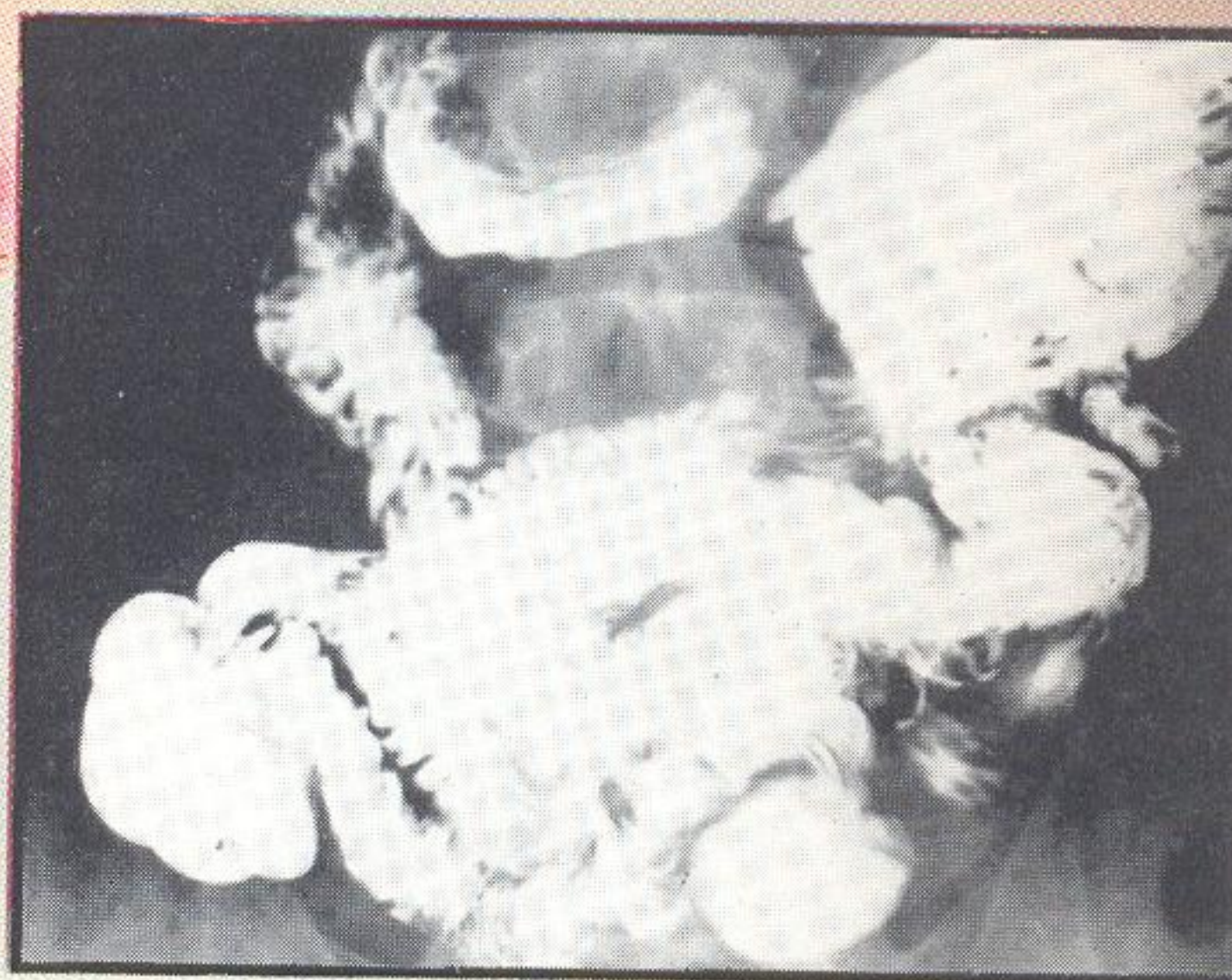
SOLITARY DIVERTICULUM



ARTERIAL ARRANGEMENT
IN BOWEL WALL



MULTIPLE DIVERTICULA



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